RAILROAD GAZETTE

FRIDAY, MAY 1, 1903.

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Contributions

Landscape Gardening on the Philadelphia, Baltimore & Washington.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In answer to your inquiry, the credit for first starting landscape gardening on this road is due to the officers of the old Philadelphia, Wilmington & Baltimore, who, previous to the transfer and control to the Pennsylvania, in 1881, had erected greenhouses at Newark and established a system of setting out, each summer, flowering plants and shrubbery at various points along the railroad. Since the Pennsylvania has taken control, the work has been carried on to a much greater extent and the greenhouses at Newark station, for furnishing the plants and shrubbery, have been much enlarged. The work of beautifying the station grounds and maintaining the green houses has been under the supervision of a landscape gardener and his assistant; the assistant having direct charge of the greenhouses and the shipment of all plants and shrubbery, in accordance with the instructions given by the landscape gardener. In order to properly maintain this system a force of from 15 to 20 men is required in winter, and from 30 to 35 men in summer. These men receive, outside of the landscape gardener and his assistant, 15.4 cents an hour.

It has been found that hedges and flowering shrubbery are of more value in beautifying station grounds than hot-house plants that have to be planted, and which die down each season. Of late years, therefore, the tendency has been to plant hedges of California privet and osage orange, which serve the double purpose of taking the place of fences, and at the same time are very ornamental. Nearly all of the station grounds and a great many vacant spaces around yardmaster's offices and other buildings are provided each year with plants and shrubbery.

The landscape gardener reports to the General Superintendent for work done on each division of the P., B. & W., and to the Superintendent, and Assistant Engineer, of the division on which the work is done. The expense of maintaining this system has been very reasonable in comparison with the value of the work done.

E. F. BROOKS.

Timber Foundation in a Marsh, in 1850.

Muncie, Ind., April 20, 1903.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In the columns of the *Railroad Gazette* I notice an article on the soft foundation for the Southern Pacific (Lucin cut-off) that reminds me of an experience met with somewhat similar at Milwaukee, Wis.

In the year 1850 track laying upon the old Milwaukee & Mississippi Railroad (now the Chicago, Milwaukee & St. Paul) was begun in October, between Milwaukee and Waukesha, commencing near the location that the Armour Packing Company now occupies, on Milwaukee River above the mouth of the Menomonee. The road passed over low ground and marsh to a point of high ground some 800 ft. or more from place of beginning, on what is now West Water street. A cut through this point reached low marshy ground again, over which an embankment was raised about 2 ft. to grade level.

Track laying on the Gorman & Hackett contract, first section out of Milwaukee, was stopped early in November by heavy rains and by the sinking of the marsh above the point cut, where some 300 ft. settled out of sight. In December, the weight of gravel placed upon the marsh, some 300 ft. long, becoming saturated by a heavy fall of rain, began to sink. A train, composed of two flat cars loaded the night before, was hauled over the marsh to dump, and while the engine and cars were going over the marsh, the grade began to go down, and before the gravel was one-half off the ties were under water. The train pulled off as soon as possible, leaving the two cars and locomotive west of the sinking section. Oak ties were split at rail joints (as no chairs were used under the ends of the rails) and it was with difficulty that the rails were saved, and the place was made passable. Trees from 10 to 16 in. in diameter were hauled from near Wawatosa and placed across the grade, as close as possible to each other, the limbs being chopped off and covered over the bodies, making a strong network or bed for placing a timber foundation, with butts and tops extending over the marsh 15 or 18 ft. upon either side. On this foundation timber work was built up about 10 ft. wide, of 12 in. x 12 in. sawed material, and at one end (east) 14 of these cribs were placed, one over the other, and firmly pinned together, strong cross stays of switch ties being dovetailed at either end into the walls, forming the crib. The west end required but 12 of these square timbers, upon a side, to form each wall. The timbers were placed by carpenters, as the pressure settled them, by filling with material from the gravel bank nearby. The trees began to double under the pressure as the grade settled, and the marsh began to rise at the sides, and in the spring only a few of the butts of the trees were visible above the marsh, and these were pressed close to the crib work.

WALTER S. PHELPS.

American Railway Association.

This Association held its annual meeting in New York City, April 22. There were present 115 delegates, representing 80 members; and Mr. A. W. Sullivan, President, was in the chair. The membership of the Association now comprises 276 members, operating 208,459 miles. A member of the Association having presented the subject of the proper design and construction of tank cars for the safe transportation of volatile oils, it was

"Resolved, That the Secretary be instructed to refer to the Master Car Builders' Association the question of the proper design and construction of tank car equipment for the safe transportation of volatile oils, with the request that the matter be given prompt consideration and a report submitted, with plans and specifications covering their recommendations." On request of Dr. Hubert Jansen, of the Society of German Engineers, which Society is to compile a technical dictionary in English, German, and French, the Executive Committee stated that it would be very glad if any officials connected with members of the Association could assist in the compilation.

The third bound volume of the Proceedings of the Association, covering sessions held from April, 1899, to October, 1902, inclusive, is now ready for distribution.

The following amendment to Section 4 of the By-Laws was adopted by the Association: "Ex-Presidents of the Association shall be ex-officio members of the Executive Committee, so long as they shall be eligible to membership on committees.

The Committee on Train Rules reported decisions which it had made on Rule 92 and Form C, which were approved. The Committee on Safety Appliances, the Committee on Statistical Inquiry, and the Committee on Standard Cipher Code reported progress.

The Committee on Standard dimensions of box cars gave an outline of the investigations which have been made to show the results which followed the passage by the Association of the resolution fixing the dimensions of the standard box car. Statistics were given showing the proportion of standard to non-standard box cars which have been built within the past year. The committee also gave a table showing the weights of various commodities that can be loaded in the different size cars, together with the minimums established by the different classifications. The territories covered by the Official and Southern Classification Committees, show the largest proportion of standard box cars constructed, the percentages being respectively 83 and 98.1 per cent., the recommendations made by the association as to percentages of increase in minimums for cars over 36 ft. long having been adhered to. The Western Classification Committee did not adopt these recommendations and therefore the "large-car nuisance" is not being so rapidly abated in western territory. The standard car is actually penalized from a classification standpoint. The desirability of the standard car from an economical, mechanical viewpoint is not open to question. That question may be regarded as settled and anything which interferes with its adoption is now placed upon the defensive.

"Your committee calls special attention to the fact that the idea that seems to prevail in some quarters that the preference in classification given to the standard car will make the large car useless is not well founded. While the large car will not have an advantage over smaller cars as heretofore, and will therefore not be built hereafter, it can still be used economically until worn out, for the transportation of a large number of commodities at the percentages of increases for cars over 36 ft. in length, recommended by this association. The chairman of one of the classification committees, after a careful examination, estimates that 95 per cent. of all commodities can be so carried when housing conditions are favorable.

"Your committee feels that the results so far attained have demonstrated that the advantages expected from the adoption of the standard box car will have been secured when the standard car becomes the ordinary vehicle of freight transportation, and other cars the exception. It, therefore, urges that all advantages which may appear to arise from discrepancies in classifications and other regulations which may interfere with this most important step toward uniformity should be considered as secondary, and that steps should be taken at once by the proper authorities to bring them into line."

The Committee on Car Service presented a report suggesting several amendments to the Code of Per Diem Rules and the Code of Car Service Rules. The sentiment of the meeting was, however, overwhelmingly in favor of letting the per diem experiment go on for another six months without any change in the rules, and the report was recommitted. This appears to have been entirely satisfactory to the committee. The meeting apparently favored the committee's proposals but thought that the demand for changes was not pressing. The interpretations of the Per Diem Rules by the Arbitration Committee, reported to the Association through the Committee on Car Service, were approved. The report says, in part:

"The first result of the per diem agreement was the speedy return of a large number of cars to their owners, and since the per diem rules went into effect car owners have had a greater command of their equipment than heretofore, as well as a larger return for it when on foreign roads.

"For the last six months of 1902 the percentage of home cars on roads reporting was 9.6 per cent. more than the year before. For the cars that were away from home they received 20 cents a day per car or more. Exactly what these roads received in the year before the records do not show, but, as the figures gathered by the committee a year ago showed that on the mileage plan railroads were receiving 12 cents a car per day for their cars on foreign roads, they are now receiving at least 8 cents a car per day more, an increase of 67 per cent.

"The per diem plan may thus be said to have accomplished the ends for which it was designed. It has given car owners a better control of their equipment. It has increased their compensation for the use of equipment in the hands of others, and it has certainly afforded each railroad an opportunity to check the car service accounts of other railroads using its cars. These ends have not been gained without cost.

"There has been an increased cost to railroads which have done a larger portion of their business in the cars of others. There has been a further cost in the form of additional correspondence and clerical work. These difficulties have arisen under the operation of rule 3, which covers the penalty rate, and rule 5, which covers the switching reclaim. There have also been difficulties in the administration of rule 14 relating to interchange of cars.

"Again, a number of railroads have found themselves short of power when their own equipment was returned to them through the results of per diem, and these railroads have been unable promptly to return foreign cars. Both of these causes were probably active in bringing about the decreased mileage per car per day. For the last six months of 1901 there was an average of 21.6 miles per car per day, which dropped in the last six months of 1902 to 20.8. There is another cause which doubtless tended to this end, namely—the immense increase of freight cars of service.

"Reports at hand indicate an increase of 7.4 per cent. in railroad freight cars, and of 5.2 per cent. in private freight cars. This would seem to indicate that there was an increase of at least 100,000 freight cars on all railroads in the country, and unless there was a corresponding increase in the effective motive power and terminal facilities, a decrease in the miles per car per day was inevitable. As it is impossible to separate clearly all the results of per diem, it would seem wisest to continue for a further term the present rules without change were it not that it seems certain that a considerable proportion of the difficulties could be avoided by some changes of the rules."

The committee then goes on to propose that the penalty rate for cars detained more than 30 days be automatic; that is to say, that the dollar a day shall be paid regardless of whether or not the owner demands the return of the car; that Rule 5 be amended so that in each switching territory the railroads may adjust the per diem by a change in the switching rate, or by a reclaim, or by allowing free time. In discussing the desirability of increasing the regular rate to a figure higher than 20 cents a day the report says that the actual payments have averaged a good deal more than 20 cents in some cases; this in consequence of the large number of cars on which the penalty has had to be paid. On some roads which were short of equipment and have not had time to replenish their stock this increase was as much as 25 per cent. In order to avoid oppressing these companies the committee advised that no change be made for at least six months. On the question of trying to bring private cars into the per diem agreement the committee finds much ground for doubt. It is by no means

certain that the railroads of the country in general are ready for this change. In the case of coal cars it is doubtful whether the private car owners ought to have the advantages of the per diem system.

As before stated the Association postponed until October the question of adopting these recommendations of the committee.

The officers of the Association were all re-elected, as follows: President, A. W. Sullivan, Illinois Central; First Vice-President, Geo. W. Stevens, Chesapeake & Ohio; Second Vice-President, C. G. Waldo, Cincinnati, Hamilton & Dayton.

Mr. Theo. N. Ely, Chief of Motive Power, Pennsylvania R. R., was re-elected a member of the Executive Committee, and Mr. I. G. Rawn, Assistant to the Second Vice-President, Illinois Central R. R., was elected a member of that committee.

The following companies were elected members of the Committee on Train Rules: Hocking Valley; Louisville & Nashville; Pennsylvania.

The next meeting of the Association will be held in Richmond, Va., on Oct. 28, 1903.

Automatic Block Signals on the C., M. & St. P.

The Chicago, Milwaukee & St. Paul has recently put automatic signals in use on 14 miles of double track between Savanna, Ill., and Green Island, Iowa. The signals are of the two-position motor-operated semaphore pattern, made by the Union Switch & Signal Co. There are 11 distant signals and 13 home signals. Each distant signal is on a post by itself and not with a home signal. The block sections vary in length from 4,700 ft. to three miles. That part of the track between Savanna and Sabula, a distance of two miles, is used by both main line and branch trains, and as some of them are scheduled to run close together, the blocks are made shorter than those between Sabula and Green Island. The three-mile blocks between Sabula and Green Island would be too long if trains were run close together, but the manually

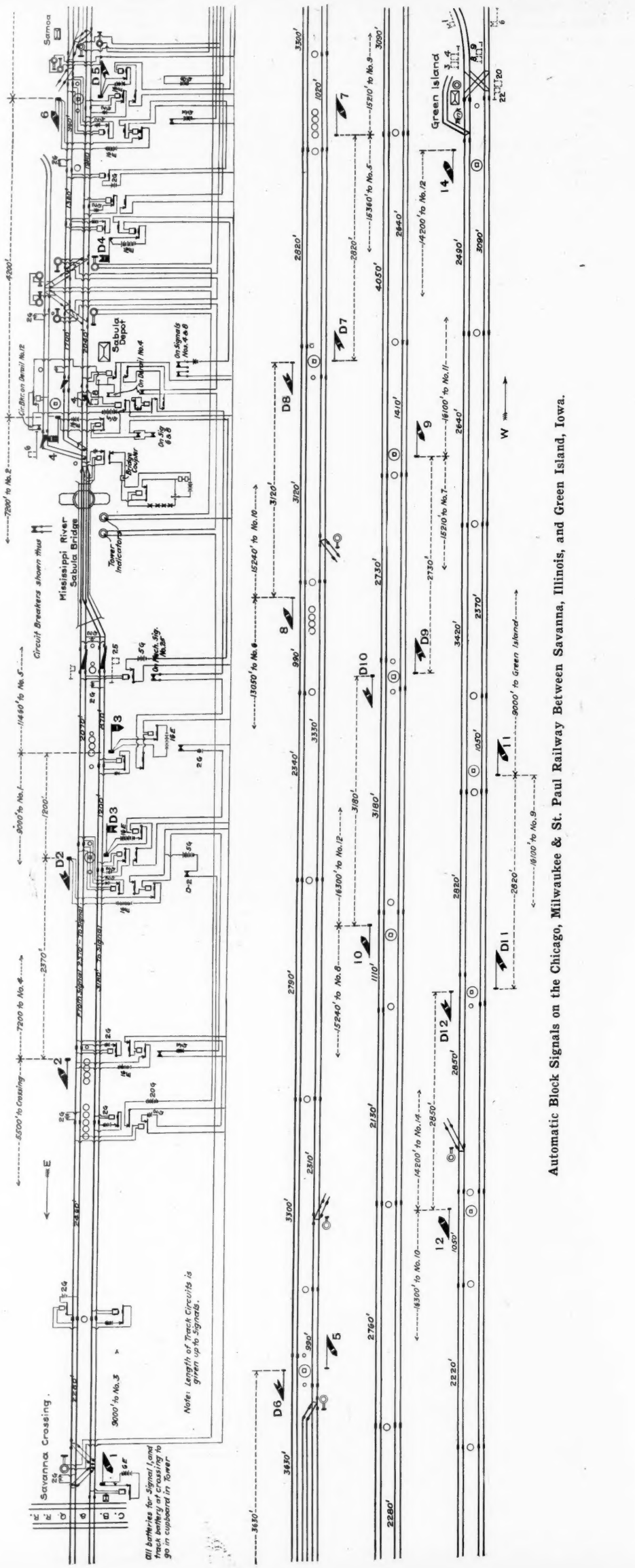
Home Signal No. 6 and Distant Signal D5, Samoa, Iowa. Looking West.

operated telegraph blocks west of Green Island average four miles in length.

Mr. Elliott, the signal engineer, has given us the following description:

The distant signals have been set 3,000 ft. from the home signals in each instance except at the approach to the interlocked drawbridge at Sabula, where, owing to the curvature and the grade, trains are forced to run slowly. Separate home block signals are placed at either side of the interlocking over the bridge and the interlocking (manual) home signals are not slotted. This practice was thought best and worth the expense of the extra signal. It is believed that by having separate signals, engineers can be better informed of the condition of the block and less likely to get into trouble. The interlocking home signal is an absolute stop signal and should not be passed until in the proceed position or an understanding is had with the signalman that the derails and switches are properly set for the train to proceed. On the other hand, the block signal is really a permissive signal and the rules allow a train to proceed after stopping for one minute at the signal. As the westbound interlocking home signal is 2,075 ft. from the center of the draw, a slotted signal would make it necessary to give hand signals if trains were not to be unduly delayed when the circuits failed or there was a train in the block. The signalman would be tempted to give hand signals without examining the derails to know if they were properly closed and trains might be signaled to go ahead when it was not safe for them to proceed.

The drawing shows that overlapping sections are provided for each home signal. This is unusual when distant signals are used, but the St. Paul management deems it a necessary precaution, worth the expense incurred. At all interlocked crossings in the western States it is usual to provide derails about 500 ft. from a crossing or fouling point which will derail a train if the signal is run by improperly. Experience with these has shown that even on roads having the strictest discipline, derailments sometimes occur. Enginemen are not infallible and occasionally make mistakes; and in order to guard against a collision occurring when a mistake is made, sufficient space is provided between the home signal and the fouling point to enable a train to be brought to a stop before the fouling point is reached. If it is necessary to provide


Samoa
Sabula Depot
Mississippi River Sabula Bridge
Circuit Breakers shown thus
Savanna Crossing
Green Island
Note: Length of Track Circuits is given up to Signals.
All batteries for Signal 1 and track battery at crossing to go in cupboard in Tower.
E
W

Automatic Block Signals on the Chicago, Milwaukee & St. Paul Railway Between Savanna, Illinois, and Green Island, Iowa.

this distance at an interlocking, it is certainly advisable to give the same measure of protection at a block signal where an equally serious collision may happen. As long as it is not considered good practice to put the home signal of an interlocking 5 ft. from the fouling point consistency requires that a train should not have the right to run up to but not beyond a home signal that may be less than 5 ft. in the rear of a train standing in the block.

All of the signals are placed ahead of the point where the track circuit or block section begins, in order that the engineer may observe the signal change from "proceed" to "stop." If the signal does not change, the indication must be taken to mean stop, and a stop of one minute must be made by the train the same as if the arm were in the stop position. The usual distance that the signal is placed ahead in the block is 180 ft., but this is reduced where the speed of trains is slow. This practice is regarded as very satisfactory, as there are but few possible ways that the signal may operate properly and the block not be clear. A fusing of the relay points at the signal or the sticking of the mechanism will hold the signal in the clear position, but in such case the signal will not operate as the train passes it. The enginemen are careful to observe the signals change and all speak favorably of the arrangement.

The track relays are 4-ohm, with platinum contacts. The relays that break the motor circuits have platinum contacts and are guaranteed not to fuse with 50 amperes. The track relays are arranged to break and shunt the circuits of adjoining sections, although the shunt wiring for this is not shown on the plan. The relays for the overlapping and distant signal line wire circuits are of 5-ohms resistance, and the armature will not be lifted by a crossed line wire circuit. No. 12 B. W. G. bare copper wire is used for all line wire circuits. No. 6 B. & S. insulated wire is used for motor circuits, and the wires in all battery wells are stranded. The switch indicators are provided with lamps having a long burning oil font, and the disk can be seen as easily at night as in the day.

As operators are on duty at all times at Savanna and Sabula, signals 1 and 4 are made absolute and trains are not allowed to pass them if in the stop position. In case of failure of the signals the despatcher is notified and on permission from him the operators issue a permissive card allowing the train to proceed.

In the diagram the east end of the section of road signaled is at the upper left hand, and the west end at the lower right. The signaling apparatus is arranged on the same principles throughout the section from Savanna Crossing to Green Island, but to simplify the drawing the wires, relays, etc., are shown only for the section from signal 1 to signal 6.

The small circles of different diameters indicate battery chutes and wells. The smallest circles are meant for 12 in. chutes holding two cells of gravity battery. The medium size circle represents an 18 in. chute holding six cells of gravity or potash battery. The largest circles with a small square in the center show large battery wells holding 16 or more cells. The wells, as a rule, are placed on the side of the track but for convenience are shown between tracks. At certain signals there are a number of 18 in. chutes; this is because it was not possible to put in a large well owing to the track being on a high bank with water on both sides.

The circles surmounting a short post designate switch indicators. The two circles shown below the bridge represent indicators in the signal tower of the bridge.

Signal No. 8 is on the north side of the track because the post would have to be placed in the middle of a narrow platform if put where it belongs. There is a sharp curve commencing west of Sabula depot, and the signal looks from an approaching train as if it stood on the right side of the track until quite close to it. Signal D4 is put on the left side of the westbound track, as there is not room enough to put it on the right side of the eastbound track. The signal would have been put on the right side of the right hand track, but this track is used as single track and trains run in both directions on it. If it had been necessary to put the signal on the right side, a bracket pole would have been used.

The circuits are arranged for the signals to stand normally at clear except those at either end of the bridge interlocking. Home signals 3 and 4 are arranged to clear when the derail is closed and the (manual) home signal for the route set has been cleared. Circuit breakers on the derail points, and on the signals, break the signal circuit when the home signal is normal and the derail point open. This arrangement is exceedingly simple and it utilizes the mechanical interlocking of the interlocking functions to secure the interlocking of signals 3 and 4, making it unnecessary to do this electrically.

The track circuit relays break the circuit of the adjoining section in the block and break the signal circuit only at the overlap and at the signals. Danger from lightning is thus reduced to a minimum. The distant signals are controlled by the track relay of the section between the distant and the home signal and by a circuit closer on the home signal which closes the circuit as soon as the home signal has assumed the proceed position. The switch and bridge indicator circuits are broken by relays and by circuit breakers on the distant signals, and the indicator disks drop before a train enters the block. The overlap circuit cuts the motor circuit of the signal and also the track circuit of the block in the rear, and thus holds two home signals in the stop position when a train is occupying the overlap section.

The following special rules are prescribed in addition to those usually issued.

Signal No. 4 at Sabula works in connection with the interlocking signals and will not indicate "at clear" unless one of the eastbound home signals is at clear. The distant signal D-4, located 1,700 ft. west of signal No. 4, works in connection with eastbound signal of the interlocking and also with signal No. 4.

Distant signal D-3, located 1,500 ft. east of signal No. 3, works in connection with the westbound home signal of the interlocking and also with signal No. 3.

The signals are located within the limits of the section so that enginemen may observe the signal change from "clear" to the "stop" position as they enter the section and before they have passed the signal.

The extreme limits of the section are indicated by a sign marked "block," and any train passing this sign is within the section and should set the signal in the "stop" position.

To govern trains leaving sidings for main track or to cross from one main track to the other, switch indicators of the disk form are provided at each side track switch.

At cross-over switches the indicator at the switch in the main track upon which the train is standing will indicate whether or not the section on the opposite track is occupied by a train.

The indicators work in connection with the home signal governing the section, and will indicate "stop" when an approaching train is within 1,000 ft. of the distant signal, and as long as a train is in the section.

If a signal is "at clear" and changes to "stop" when the head end of a train enters the section, the train will proceed. If the signal does not change, it must be taken as a "stop" indication and movements will only be made as provided in rule 22.

(Rule 22.) If, on approaching a signal and the signal is "at stop" it indicates that there is a train in the section, a switch wrong, or that there is a failure of the apparatus; and the train must be brought to a stop before passing the block sign. At signals other than numbers 1 and 4, if after waiting one minute, the signal does not change to the position indicating "at clear," trains may proceed, using caution and expecting to find a train in the section, a switch wrong or a broken rail.

It is important that a train finding a signal in the "stop" position should stop before passing the block sign, because after the train passes the sign the train itself will hold the signal at "stop" position.

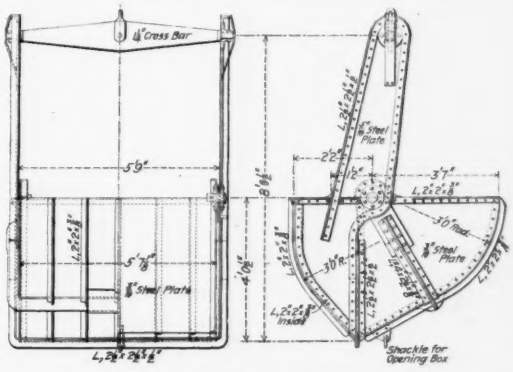
Should a signal change to "stop" position before an approaching train has passed the block sign and the train run by before being able to stop, it will wait one minute and then proceed as per Rule 22.

Whenever by reason of fog or any cause, the indication of the signals cannot be seen, the train must be brought to a stop and proceed as per rule 22.

English Shipping Appliances for Coal.

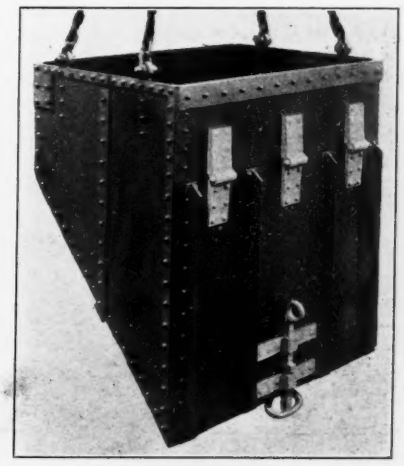
There are many centers of the coal trade in England and Wales, the most notable being in the Counties of Northumberland, Durham, Lancashire, Yorkshire, etc., and what is known as the Great South Wales district around Cardiff in Wales. The present paper is concerned only with the Northumberland and Durham coal and with that from South Wales. These two centers have radically different methods of shipping their export coal. In the northeast the high level staiths or wharves are used, similar to those near Baltimore, Md., on the Baltimore & Ohio, and the traffic is handled entirely in hopper cars. But in South Wales the car is raised in a cradle and then tipped and the coal is discharged through an end door, something on the principle by which ore is loaded into the boats on the Great Lakes, in the United States.

The coal shipped from the North is much less brittle than the coal from the South, and though there are not as yet any permanent anti-breakage methods in use, the breakage by the high level wharf method of shipment does not seem to be greater than when the cars are lifted and



Rapid Despatch Anti-Breakage Box, Taff Vale Railway.

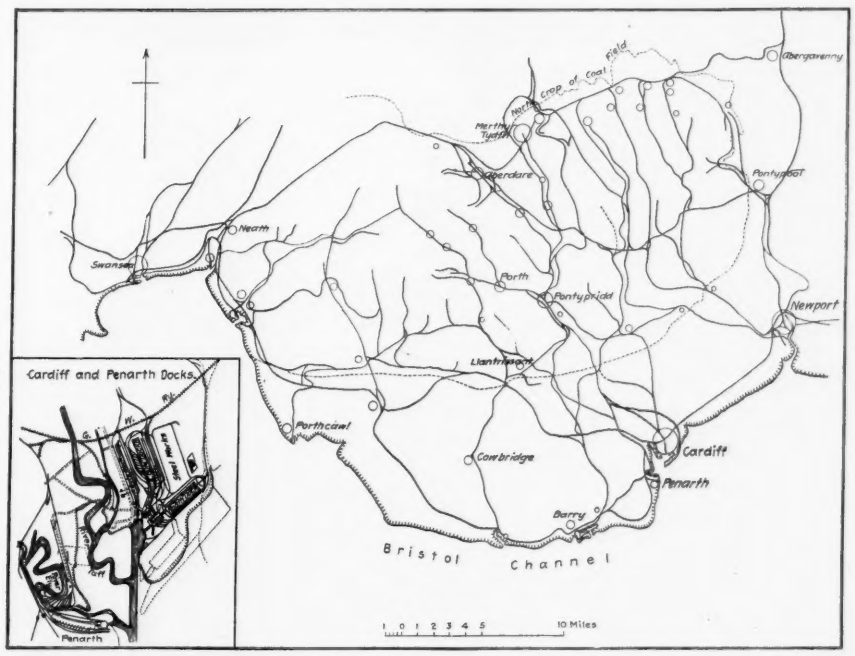
tipped and anti-breakage appliances are used, as in South Wales. In either case the breakage is insignificant. The chief ports of the North are Tyne Dock, Dunston in the River Tyne, and Blyth, about 10 miles north of Newcastle. Blyth is particularly well adapted as a shipping port, as there are about 20 collieries within a radius of



Barry Anti-Breakage Box.

four miles and the longest haul is only about seven miles. This is the port for the Northumberland coal. Dunston is a large center in the Tyne region and Tyne Dock has, perhaps, as large a shipment as any single dock of the same size, the output in 1901 being over 7¼ million tons handled with a water area of 50 acres.

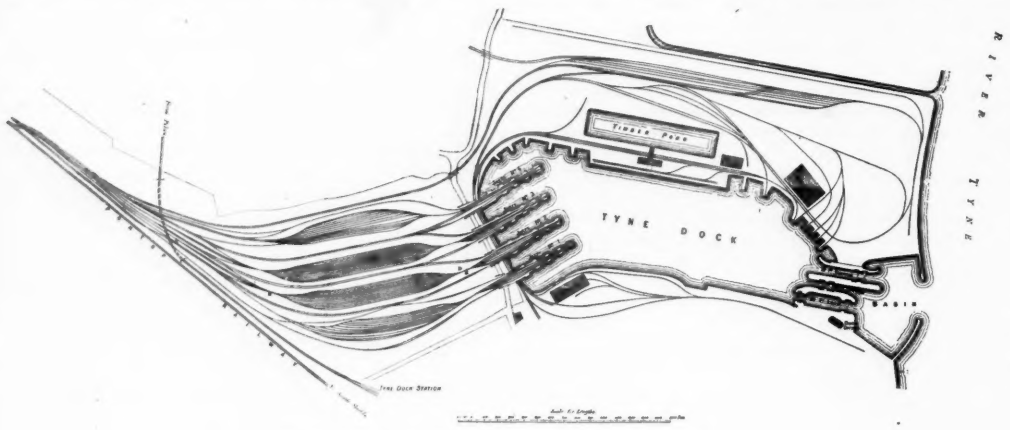
Blyth harbor is said to have been in use as a shipping port for the last 600 years, but it has grown to its present important position during the last 20. In 1856 the harbor was dry at low water; in 1881 two coaling stations were built on the north side of the river by the North Eastern Railway in connection with the harbor board; between 1885 and 1898 new piers were built and general improvements made, and in the last named year the harbor entrance was deepened to a minimum of 16 ft. at low water. The area of the harbor is about 83 acres and ships of 10,000 tons burthen have used it. The coal shipments have increased from 1,046,264 tons in 1883 to 3,343,732 tons in 1902, and in addition to this there is



Taff Vale Railway, Showing Coal Fields and Enlarged Plan of Docks at Cardiff and Penarth.

also a considerable import trade and there are five large graving docks. The dock dues are not heavy and the shipment is very rapid, although berths are in very great demand.

The tracks on the wharves from the receiving sidings



General Plan of Tyne Dock and Storage Sidings.

to the loading berths are arranged on a gravity system, so that after the loaded cars are taken up by pushing engines and their contents discharged through hoppers into the hold of the ship, they are worked back again by gravity to the staiths on the south side of the receiving sidings, and from that point are returned to the collieries. It has been found that any attempt to fit this system with an anti-breaker reduces the speed to a very marked degree, and as the loss by breakage, as previously stated, is very slight, no great efforts have been made to remedy it, although various devices are tried from time to time. A conveyor system with a series of belts on endless chains in a tube is now being used in some places, in which the weight of the coal furnishes the motive power and a friction pulley governs the speed, and the device seems to give much satisfaction to the colliery companies which use it.

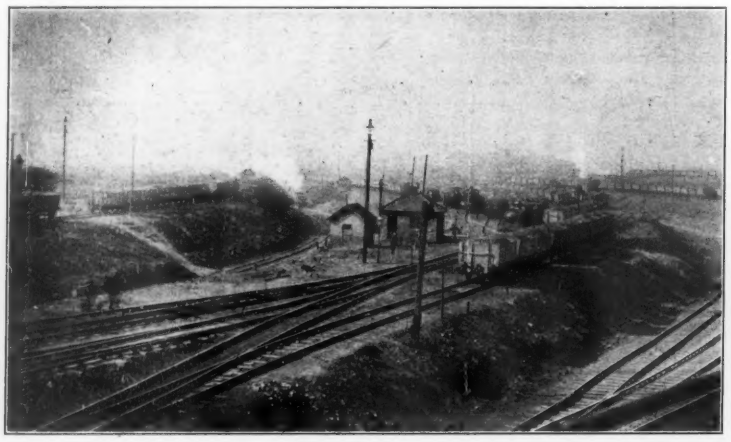
South Blyth is an older coal shipping point and the amount of coal shipped has increased from less than 75,000 tons in 1880 to over 2,000,000 tons in 1895, before the opening of North Blyth harbor. Since then it has fallen off almost half. Here the methods of shipment are exactly the same as those described above. The staiths are fitted with 16 spouts and can dock eight large vessels at the same time. If the train service is uninterrupted they can handle from 650 to 700 tons an hour. Dunston is a high level staith built in the River Tyne above Newcastle, and has at present in use six bins, enabling three large vessels to coal at the same time. Arrangements are now being made to double the accommodations. The coal port was opened here in 1894, and in the first year over 1,200,000 tons were shipped, relieving the congestion at Tyne Dock.

The coal traffic for Tyne Dock is worked by train engines from the various centers to the receiving yard, and the cars are afterwards dropped down by gravity from the receiving yard into what are known as the "fields." The cars are afterwards run as required in batches of three or four on the staiths by gravity, and as each car passes over the mouth of the spout the hopper doors are opened and the coal runs down the spout by gravity into the hold of the ship. After the three or four cars have been emptied they are allowed to fall back again in the same direction from which they have come on to another line laid on a lower level, and they reach the empty car sidings by gravity on this line, and are taken from there back to the collieries by locomotives. The introduction of the newer engines has enabled the normal loading to be increased to 60 cars, a total load behind the tender of 990 tons.

Tyne Dock was opened in 1859 and the diagram of the dock explains itself. There are four jetties with eight spouts each and the water area is about 50 acres. Shipments have risen from 1,421,675 tons in 1860 to 7,228,145 in 1901, and in spite of the other docks previously mentioned which have tended to relieve Tyne Dock, each year marks a steady increase, and at the present time the opening of the additions to the Dunston property is greatly desired. With the present arrangements of the spouts it is interesting to note that the capacity of the dock has steadily decreased proportional with the increase of the size of the boats taking cargo. When first built the jetties would take three vessels on each side. Now, there is only room, as a rule, for two, and in the case of the newest and largest ships for one. The rapid increase in the sizes of the carriers is shown by the fact that in 1890 only six ships with a net register of over 2,000 tons came to the dock, while in 1901, 207 with tonnage over the 2,000 mark received coal there.

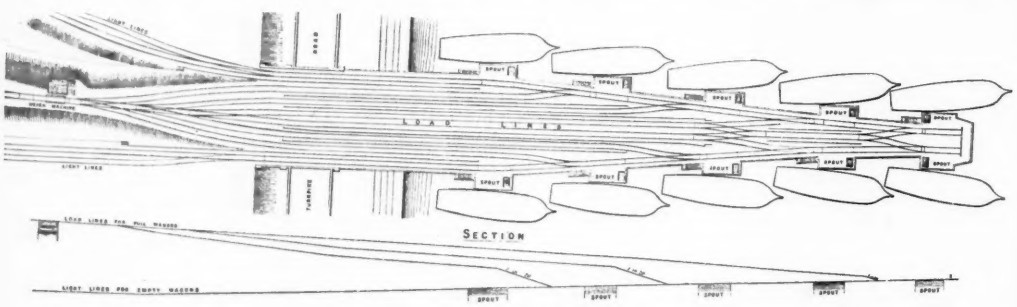
In South Wales, which, like the North, is a district of short hauls, the longest being less than 20 miles, the three ports are Cardiff, Penarth and Barry. Cardiff is the property of the Marquis of Bute; Penarth belongs to the Taff Vale Railway, and Barry is owned by the railroad company which bears the same name. At each of these ports there are special appliances for preventing the breakage of the coal, some of which are illustrated here. The cost of installation, however, especially at Cardiff, where the Lewis-Hunter cranes are in use, is so high that it would seem scarcely practicable for use in the United States. At Penarth and Barry, however, the arrangements are more simple and are also more rapid.

At Cardiff, the Roath dock has an area of 33 acres and a maximum depth of 35 ft. 9 in. This dock was opened in 1887 and is equipped with the Lewis-Hunter coal cranes, mentioned above. The elevator, on which the car is run, is raised until the car is tilted at an angle of about 45 deg., when the end door is knocked out and the coal falls by its own weight into the box of the crane. This box, which is carried on a small truck, holds a carload and is lifted and swung by the crane into the hold of the ship, so that there is no fall whatever and breakage of coal is reduced to a minimum. There are at present 11 of these cranes on the dock and four of them can be used in loading one ship. The jibs of the cranes have a swing of about 40 ft., so that the vessel can be trimmed easily without manual work. The cost of loading by this process is estimated at about 4 cents per long ton, with an extra charge of ½ cent per ton for the weighing. Using four cranes 9,213 tons have been loaded into a ship at the rate of 347 tons per hour. The serious objection to the cranes, however, is their original cost and also a cost of operation somewhat greater than by other systems, and it has not yet been decided whether the new 50 acre dock which is to be built will be fitted with the cranes or with the ordinary tips.

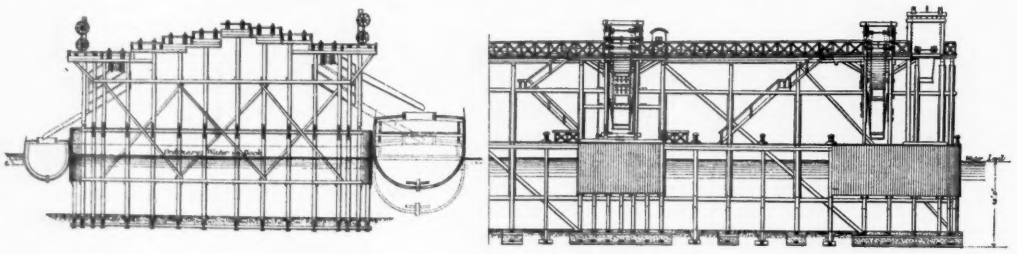


Tyne Dock, Storage Sidings.

Tyne Dock, Nos. 3 and 4.

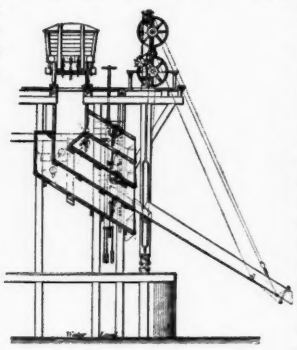


Plan of Coal Shipping Jetty.



Sectional Views of Jetty at Tyne Dock.

At Penarth, across the Bay from Cardiff, the method is to tip the cars by means of hydraulic elevators, as previously stated. The four new tips used are movable, and the frames are 96 ft. high. The specifications called for a tip that would lift a loaded 10-ton wagon 45 ft. above the level of the quay, tip the wagon and return it within a period of 30 seconds. The cradle which contains the car is lifted above the quay by four direct acting rams, and after the height of the lift has once been determined it is regulated automatically. The device used here to prevent breakage is a box containing two or three tons, which is fixed to the end of the spout. The working of this is very simple and occasions no trouble. The machinery is all hydraulic.



At Barry, which is perhaps the most modern and up-to-date of the ports, the establishment of the dock, opened in 1889, was the result of a quarrel with the managements at Cardiff and Penarth. The minimum depth of water on the sills at the lowest spring tides is about 13 ft. Here there are 38 tips for coal shipping and the maximum speed is 490 tons per tip per hour. There are scales on both the loaded and the empty tracks. The water of the two docks is 107 acres, and the amount of

coal shipped was 7,226,286 tons in 1901, comparing with 8,279 tons at Cardiff in 1899, since which time there has been a slight falling off at the latter port. The tips have frames 73 ft. 6 in. high, with a lift of 45 ft. and hoisting capacity of 20 tons. The cradle on which the cars are supported is 24 ft. 2 in. long by 14 ft. 6½ in. wide over the outside guides, admitting a standard gage 10-ton car. Anti-breakage boxes of four tons capacity are used at the bottom of the chutes.

It is likely that each system is best adapted to the needs of the locality where it is used, but in the case of Cardiff it seems to the observer that the cost of the anti-breakage appliances has been too great, and that in other places results about as good have been secured by much simpler means, as in the case of the high level staiths and hopper cars in the north. In each system there is much of value and interest to any country that is building up a coal export trade.

Fort Wayne Shop Improvements.

The improvements now nearing completion at the Columbus shops of the Southwest System of the Pennsylvania Lines West of Pittsburg were described in our issue of April 17. Simultaneously with this work at Columbus the principal shops of the Northwest System, at Ft. Wayne, Ind., have been undergoing improvements quite similar in nature and extent. However, the governing conditions here were quite different from what they were at Columbus.

The old shop buildings and roundhouse at Ft. Wayne were for the most part from 30 to 40 years old. In 1882 the erecting part of the car department was moved to a site east of the city, about 1½ miles from the locomotive shops, the planing mill, car machine shop, blacksmith shop, etc., still remaining at the old plant. The locomotive shops are in the midst of the city on a tract that is restricted on all sides. A new roundhouse and engine terminal facilities formed a part of the proposed improvements, and it was decided to separate these from the locomotive department, using the space they occupied for extensions of the latter, and move the engine terminals to a new site further east. It will be seen therefore that the Ft. Wayne arrangement is an unusual one, the car shops, engine terminals and locomotive shops being on different and widely-separated tracts.

The Northwest System has a total of 1,272 miles, and the equipment comprises 612 locomotives, 528 passenger cars and 50,269 freight and miscellaneous cars. For the current year 90 locomotives will be added, bringing the total up to 702. Other shops for the system are at Allegheny, Pa., and Wellsville, Ohio, but the Ft. Wayne shops, in addition to taking care of all the locomotives on the western division, have the heavy repairs from all over the system, the figures for 1902 being 439 engines receiving classified repairs, or 36.6 per month. The old erecting shop capacity was 10 pits and for some time past seven stalls in the old roundhouse had been used.

The present improvements do not affect the car department. They include the new engine terminals about three-quarters of a mile east of the locomotive shops, a new erecting and boiler shop, new storehouse, re-arrangement of the tracks, and also the enlargement of the freight house, which occupies a part of this same tract.

The new erecting and boiler shop is 644 ft. 6 in. long and 83 ft. 6 in. wide. The design is practically a duplicate of the Columbus shop, though it differs from the latter in a few details. The principal difference is in the use in the Ft. Wayne shops of storage pits, placed between the tracks and intended for parts of engines that have been stripped and sent to the boiler shop for new fire-boxes. These pits, which are of concrete, are 5 ft. deep and 9 ft. wide, and are covered with removable flooring. The longitudinal tracks run only the length of the erecting shop, and there are pits under all three tracks. The center pit is extended through the boiler shop to serve as a conduit for pipes, electric wires, etc.

The building is at right angles to the old machine and erecting shop, the latter forming a wing to the new structure. The crane girders from the machine shop are extended into the erecting shop a sufficient distance to enable this crane to deposit material and parts within reach of the larger cranes, or vice versa.

The erecting and boiler shop will be equipped with two 75-ton cranes of 76 ft. 4 in. span, having each two auxiliary 10-ton hoists, one on each side of the main hoist, enabling material close to the walls to be picked up. By using the center track, the capacity of the erecting shop will be 23 engines. The boiler shop will have a capacity for 12 boilers. Between the erecting and boiler departments, immediately south of the old machine shop, will be placed all of the heavy tools for work on driving wheels, axles, tires, etc. This brings them under the heavy cranes, convenient for carrying parts to and from the engines.

The old machine shop is to be entirely re-arranged. A 10-ton Pawling & Harnischfeger three-motor crane, having a span of 32 ft. and traveling the length of the shop is to be put in. All of the heavy tools will be placed under this crane. The light tools will be placed in the east side of the shop, which is the old erecting shop, and the west side will be for bench and vise work.

These shops have been electrically driven since 1900, a three-phase, 220-volt system being used. In the new arrangement it is expected to use the alternating-current motors on hand for constant-speed individual drives, group drives, and at outlying points. Direct-current motors will be used for variable-speed drives and on the cranes. All of the tools in the new erecting shop will be direct-driven.

For the variable-speed drives, in order to obtain a close gradation of cutting speeds over the working range of the tool, a motor was adopted giving its nominal horse-power output through a speed range of 2 to 1 or 2½ to 1; this range being covered by a drum type controller having 12 running notches, and advancing the motor speed by approximately equal increments over the range. The wider range of speeds required at the spindle is obtained by the use of change gears, together with the usual back gears. The advantage claimed for such a system, having only a part of the total speed range of the tool in the motor itself, as compared with a system having a speed range of 6 or 7 to 1 in the motor at its nominal output are, first, decreased cost of motors and electrical equipment; second, ability to obtain a greater number of intermediate cutting speeds at the tool over a given speed range, and consequent decreased percentage of speed variation between consecutive operating points on the controller. This latter point is considered most important, since it will determine in many cases whether the output of the tool can be increased. To facilitate further the operation of the motor and insure that the workman will use the speed gradations available, controller handles are placed near the tool posts so that the speed changes may be made by the attendant while adjusting his tool.

Considerable investigation was made to obtain these results. After carefully considering the various systems advocated for this class of work it was considered that a two-wire straight field-control system, using motors with a speed range of about 2 to 1 obtained by variation of the field excitation alone, would give the desired results, and in addition permit of the simplest and cheapest electrical installation. Where size, service or location requires, individual drives will be put in. There will be six alternating-current motors on groups and four on individual drives. There will be about 47 direct-current motors, of which eight will drive groups.

The present power station was placed in operation in 1900. The boiler battery contained four 150-h.p. units, to which are being added two new 150-h.p. units, giving a total boiler capacity of 900 h.p. at 130 lbs. working pressure. In the engine room are three Westinghouse 100-k.w., 220-volt three-phase generators, direct connected to Watertown 175-h.p. vertical, cross-compound engines running at 277 r.p.m. A direct-current plant is being put in composed of two Westinghouse 200-k.w., 220-volt generators, direct connected to Buckeye 390-h.p. vertical, cross-compound, non-condensing engines running at 200 r.p.m.

Other electrical units include two sets of Wood series arc dynamos, direct-connected to General Electric 30-h.p. motors, for lighting the outlying yards 3½ miles east of the power station; and a 25-k.w. motor-generator unit composed of a 40-h.p. motor driving a three-wire system generator of 125 and 250 volts. This unit is used for the night direct-current load, also for charging storage batteries on electric lighted passenger cars and exciting the alternators.

A 50-h.p. 2,000-volt alternating-current motor drives an air compressor at the east car shops and there are two 220-volt motors of 40 and 20 h.p. respectively at the coaling station.

For power and lighting at outlying points there are three 220 to 2,400 volt step-up transformers. The present eight-panel switchboard will have four panels added to it. For alternating current power circuits a three-wire distribution system is to be used. For lighting, a three-phase, four-wire system is used. By this arrangement only about 45 per cent. of the copper is required that would be necessary for a single-phase, two-wire arrangement.

In the power station is a Laidlaw-Dunn-Gordon cross-compound, two-stage air compressor having a capacity of 790 cu. ft. of free air per minute, delivering at 100 lbs.

The storehouse is a brick building 72 ft. square with two stories and a basement. On the first floor there will be office room for the Master Mechanic and his force, the Shop Clerk and his force, and the Storekeeper. The building will contain a fireproof vault 8 ft. x 18 ft. inside and extending from basement to second floor, for storing records, etc. An electric elevator will serve the several floors. It will be noted from the plans that the track serving the storehouse passes through the south end of the machine shop.

The old boiler shop will be converted into a cab and tank shop. This department formerly occupied a part of the old roundhouse. When future extension becomes necessary it is probable that the departments now belonging to the car shop will be moved to the east shop and the boiler shop removed to this building from the new erecting and boiler shop. An industrial railroad serves all parts of the plant.

The new engine terminals are three-quarters of a mile east of their former site, and about midway between the locomotive department and the east shops. Their location at this point involved the removal of about 100,000 cu. ft. of earth.

The roundhouse is a companion to the Columbus house but has one stall more, space for only two stalls being used for in and out engine tracks. Also the drop-pits differ in design, as in the Ft. Wayne house they are built with a curvature to a radius from the center of the turntable. The driving wheel-pit serves two tracks and is built of concrete with a 2-in. coating of cement on the bottom.

The 75-ft. turn-table is electrically operated by a 10-h.p. direct-current motor supplied by Geo. P. Nichols & Bro., Chicago.

The locomotive coaling station is probably the largest ever built. This station, which was installed by the Link-Belt Machinery Co., Chicago, was described and illustrated in our issue of Dec. 19, 1902, page 956. The two coal supply tracks are run to a point northeast of the roundhouse and give space for storing 36 loaded coal cars, which by means of a gravity grade may be run down to the hoppers for unloading.

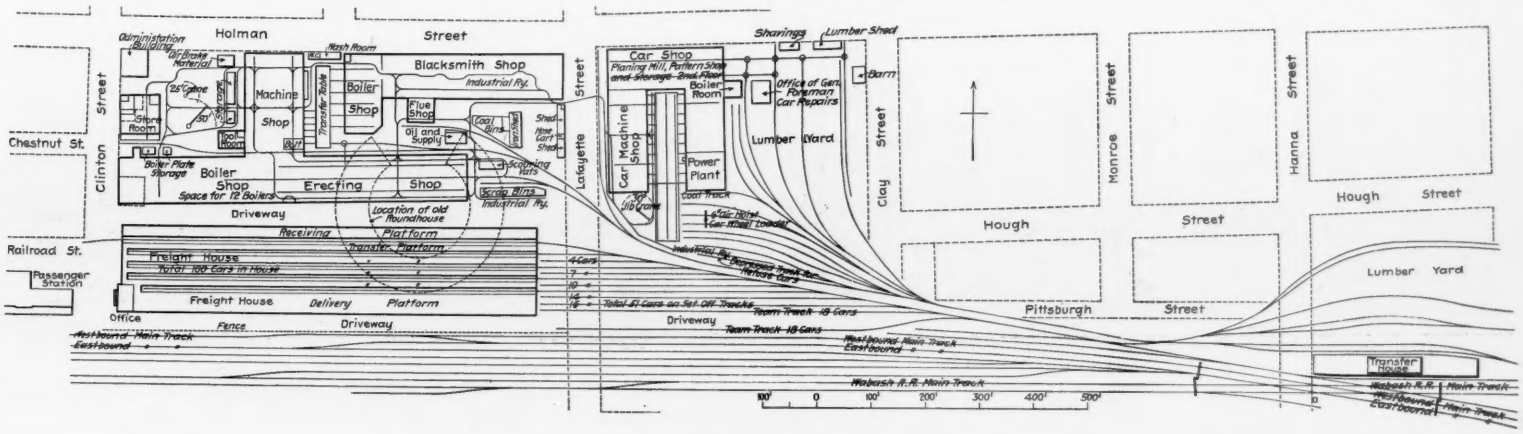
An open space north of the coaling station is to be used for coal storage, there being room for 50,000 tons. This is to provide against the car shortage which occurs at certain seasons of the year. It is probable that the coal will be carried to and from the storage pile by a radial cableway, using a clam-shell bucket to pick up and convey the coal.

The sand house is east of the coaling station, just south of the cinder pit tracks. It is arranged to feed the sand to the hopper stoves and from the stoves to an air drum by gravity. From the drum the dry sand is blown by compressed air to two pockets in the coaling station, of 600 cu. ft. capacity each.

The oil house is so arranged that the large storage tanks are below the level of the car tanks, so that the former may be filled by gravity. An air-pressure system of handling the oil is used. Oil is fed from the storage tank to a smaller tank by gravity and into the latter air pressure is introduced for raising the oil to the second story.

For general lighting of the locomotive shops, passenger station and platform enclosed-arc power-circuit lamps will be used. They will be placed two in series on the 220-volt circuits. All other outside lighting will be by series arc lamps. The freight house, storehouse, offices, etc., will be lighted by 16-c.p. incandescent lamps, and there will also be one for each tool in the shops. There will be altogether about 2,000 incandescent, 85 enclosed arc and 100 series arc lamps in use.

The heating at the roundhouse and at the locomotive shops is by the Sturtevant hot-blast system. The distri-



General Layout of the Fort Wayne Shops—Pennsylvania Lines, West.

bution in the roundhouse and the erecting and boiler shop is similar to that at Columbus. In the machine shop there will be overhead distribution with discharge branches dropping down to within 8 ft. of the floor. The storehouse and office building are heated by steam. Eventually a return system will be installed for these buildings.

Three large lavatories have been built, the locations of which are shown on the plans.

The company has its own pumping plant for supplying water for all purposes. The plant is on the St. Mary's River about 1½ miles west of the locomotive shops. Four tanks of 50,000 gallons each are west of the roundhouse.

Permapent Injunction Against Discriminating Freight Rates.

The temporary injunction against secret reduced freight rates which was issued against a number of railroads at Chicago March 24, 1902, and which was to have been the subject of a hearing June 23, but which was postponed, has at last been taken up; and at Chicago April 24 Judge Grosscup issued a permanent injunction. Only an oral decision was rendered on that day so that the record of the case lacks clearness; but the theory that "government by injunction" is a suitable remedy for illegal freight rates appears to be fully sustained. From a Chicago paper we quote:

An injunction permanently restraining 14 railroads from discriminating between shippers in making rates was issued by Judge Grosscup of the United States Circuit court, and a similar injunction will be issued against other railroads at Kansas City by Judge Phillips. The Interstate Commerce Commission began the proceedings in March of last year. Though the government had asked for its restraining order before the Elkins law was enacted, the court directed that the order show that the motion for an injunction was renewed since the passage of the Elkins act, and was granted.

In his statement from the bench, Judge Grosscup said: "The government can bring an action in equity to restrain railroad companies from discrimination, either by furnishing lower rates or by giving rebates to favored shippers.

"While each injured citizen has a right to such relief in his own behalf, in cases like those under consideration the injured persons are so numerous that it is the duty of the government to act for them.

"The Elkins law is merely declaratory of the substantive rights which existed before, and an injunction against discrimination will lie under the interstate commerce act as well as under this latter statute.

"Judge Philips and I have concluded to dispose of these cases without a written opinion. The bills allege that discrimination exists in regard to packing-house goods and the transportation of grain. It is charged that each of the railroads reaching into the grain districts has a single purchaser so favored by rates that he can exclude all others from purchasing, the effect of which is the same as though the roads were putting their own agents along their lines and giving them lower rates.

"There is no question but that such conduct is contrary to the provisions of the interstate commerce law. The first question to be passed on is: Can a court of equity take jurisdiction and sustain the right of grain growers to equal rates? There is no doubt that the interstate commerce act confers on each citizen in productive pursuits the right to have his products transported by common carriers at rates equal to those of his competitor.

"Grain growers are not affected much by single acts of discrimination. But if the trespass is continuous they can go into courts of equity. Under the averments made in these cases the producers would be entitled to injunctive relief. Another important question is: Can the government under such a state of facts bring a suit for relief, or must the injured individuals do it? In the cases under consideration the alleged violation of rights is by common carriers, servants of the government, which the government may regulate under the law. Here, too, the injured persons are so numerous, and the injury to each so infinitesimal, that it is the duty of the government to assert such rights for the injured parties."

Railroad companies whose demurrers were overruled, and against whom injunctions were issued, were:

The Michigan Central, the Pittsburgh, Fort Wayne & Chicago, the Pittsburgh, Cincinnati, Chicago & St. Louis, the Lake Shore & Michigan Southern, the Illinois Central and the Chicago & North Western.

The roads in the jurisdiction of the Kansas City court affected by the same order are:

The Chicago & Alton, the Chicago, Milwaukee & St. Paul, the Atchison, Topeka & Santa Fe, the Chicago, Burlington & Quincy, the Missouri Pacific, the Chicago, Rock Island & Pacific, and the Chicago Great Western.

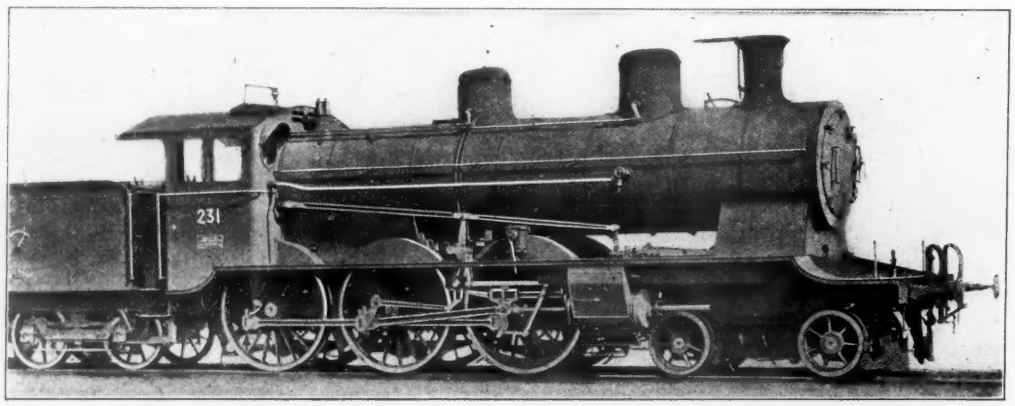
Four-Cylinder Compound for the Jura-Simplon.*

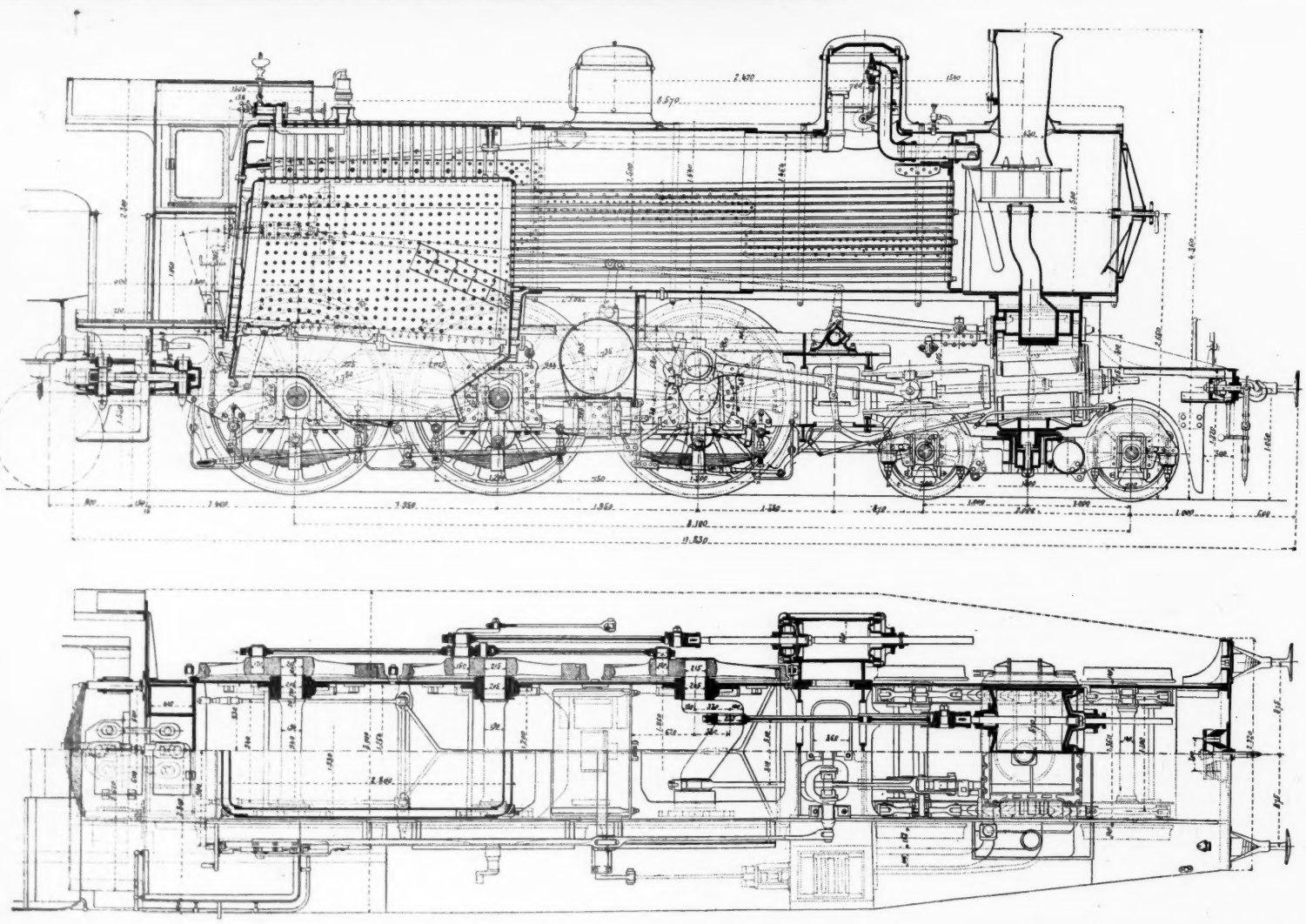
BY CAMILLE BARBEY.

The Simplon tunnel which will soon be opened will give a new road across Switzerland from the French to the Italian frontier. The road will make use of existing lines and consequently heavy grades and sharp curves will be encountered. From the map and profile shown herewith it is seen that from Pontarlier to Vallorbe the grades reach 2½ per cent., with 2 per cent. between Vallorbe and Dailliens and 1 per cent. on the run of 102.5 miles from Dailliens to Brigue. The minimum radius of curvature is 984 ft., but in general it does not exceed 1,968 ft. The locomotive shown herewith has been designed for this service and has been adopted as the standard high speed locomotive for the Simplon line. Two of these engines were put in service in August, 1902. They will also handle the trains on the Iselle-Domo d' Ossola division, which forms the southern approach to the tunnel about 12½ miles long. The 12½ miles in the tunnel will be worked by electric locomotives, the electricity being generated by water power, which is abundant in this vicinity.

The locomotives were built by the Swiss Locomotive & Machine Company, of Winterthur, and are designed to pull a train of 300 metric tons on a 1 per cent. grade at 31 miles an hour. The engines are the 4-6-0, or 10-wheel type. The cylinders are compounded according to the de Glehn system, that is, two low pressure cylinders between the frames connected to the cranked axle of the forward drivers, and two high pressure cylinders on the outside of the frames connected to the middle pair of drivers. The cylinders are $14^{5}/_{32}$ in. and $22^{7}/_{16}$ in. x 23⅝ in., and the diameter of the driving wheels is 70 in. The total

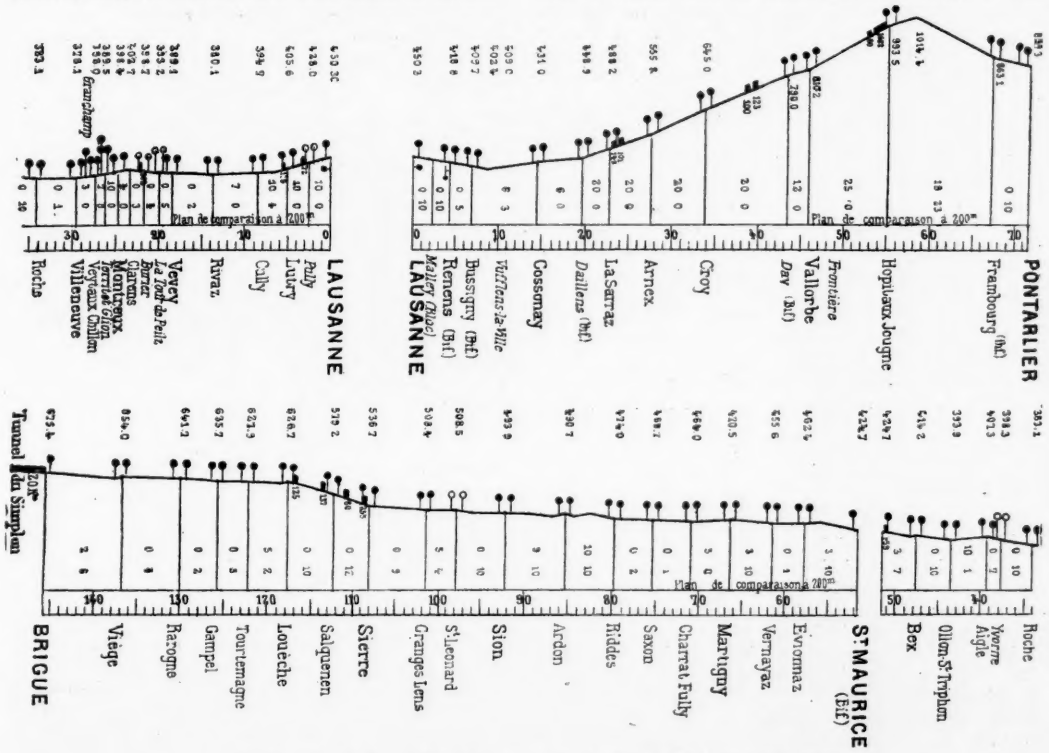
*Translated by Lawford H. Fry from the *Revue Generale des Chemins de Fer*, April, 1903.





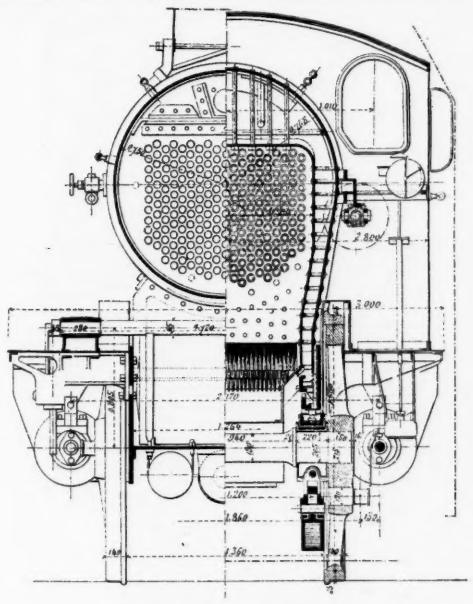
Four-Cylinder Compound for the Jura-Simplon.

weight of the engine in working order is 141,000 lbs., with an estimated weight of about 105,800 lbs. on the drivers. The boiler is straight top with Belpaire fire-box. The working pressure is 213 lbs. per sq. in. The fire-box is copper and the crown sheet is supported by eight longitudinal rows of vertical stays, the two front rows of which permit expansion. A fire-brick arch is also provided. The grate area is 29.2 sq. ft. and the grate consists of two sets of slightly inclined bars with a drop plate at the back. The circular fire door is fitted with the latest form of Lauger smoke consumer. The tubes are 2 in. outside diameter and are 13 ft. 9½ in. between tube sheets. The smoke-box is 63 in. long and the stack is tapered, extending into the front-end. The circular spark netting at the base of the stack has been removed since the engines have been placed in service.

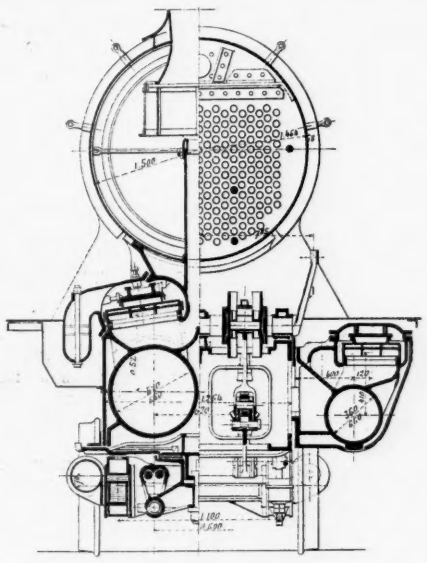


Profile of the Jura-Simplon from Pontarlier to the Simplon Tunnel.

The steam dome is carried on the front ring of the waist, and the dry-pipe is the Ramsbottom type and passes through a circular plate placed at about one-third the height of the dome, the purpose being to prevent priming. The throttle-lever is connected to the throttle-



Section Through Fire-box.



Section Through Cylinders.

valve by a rod running along the outside of the boiler and operates through a bell-crank on the dome.

The low pressure cylinders have an inclination of 1 to 20. The inside cylinders are cast in one piece with the smoke-box saddle, and are placed a little ahead of the center of the truck. All cylinders have extended piston rods. The ratio of cylinder volumes is 1 to 2.57. The valves are Richardson double ported and have extended valve stems. The valves of the high pressure cylinders are horizontal while the low pressure valves are slightly inclined outward. The Walschaert valve motion is used on the high pressure cylinders, while the low pressure cylinders have the Joy valve gear. There is no starting apparatus but merely an ordinary cock which admits boiler steam direct to the low pressure cylinders. This cock is controlled by the position of the reverse lever and only comes into action when the cut-off in the high pressure cylinders is 70 per cent. or more.

The locomotive is equipped with the Westinghouse-Henry quick acting brake on all driving, truck and tender wheels. Two Friedmann* plunger lubricators driven from the outside cross-head are used.

The tender is the 8-wheel type with outside frames, and has a capacity of 4,570 U. S. gallons and 4 metric tons of coal.

The maximum speed is fixed at 62 miles an hour, but in trials the locomotives have made 69½ miles an hour. They are at present in use on the Geneva-Berne express, which frequently has a weight of 300 metric tons on the run from Geneva to Lausanne.

Grain Rates Declared Too High.

The Interstate Commerce Commission has handed down a decision holding that the advance made a few months ago in freight rates on grain and grain products from the west to the Atlantic seaboard is not justified. As the proceeding was only a general investigation, no order can be made, but further proceedings will be begun unless the respondent carriers readjust their rates on grain and grain products on or before May 15, 1903. This decision is the result of an investigation undertaken by the Commission, on its own motion, into rates on grain, iron and beef. The rates on other articles than grain are not condemned. The railroads affected are the Michigan Central, the Lake Shore & Michigan Southern, Erie, Pennsylvania, Wabash, New York Central, Baltimore & Ohio, Delaware, Lackawanna & Western, Lehigh Valley, Southern, Norfolk & Western, Chesapeake & Ohio and Cleveland, Cincinnati, Chicago & St. Louis. The decision says in part:

Railroads are entitled to share in the general prosperity of the country; they have suffered severely in the past, and should be allowed to recuperate while that prosperity continues; but it does not follow necessarily that they are entitled to advance rates which were not reduced on account of financial depression.

Under the competitive conditions which heretofore prevailed, tariff rates on grain and grain products from Chicago to New York have not exceeded 17½ cents during the last four years, except for a brief period, while the actual rates have been materially and sometimes greatly below that figure. The legality of the recent advance of this rate to 20 cents depends upon two considerations: First, whether the increased rate is reasonable, having reference to the cost and value of the service, and as compared with rates on other commodities, and, second, whether it is reasonable in the absolute, regarded as essentially a tax upon the people who ultimately pay the transportation charge.

A rate of 17½ cents on grain and grain products from Chicago to New York is not shown, as alleged by the carriers, to be unremunerative or disproportionate as compared with other rates. Whether tested by cost of movement, by what the carriers have voluntarily accepted in the past or by comparison with rates on somewhat similar kinds of traffic, it is not unprofitable nor unreasonably low. It is from 2 to 5 cents—10 to 40 per cent.—higher than the rates actually received in recent years, and nothing appears in the financial condition of the carriers to justify a greater advance.

The commission holds that, as rates on iron articles were formerly reduced on account of commercial conditions, the advances in those rates may have been proper owing to subsequent change in such conditions; that the advance in the rate on packing house products, which was made by withdrawing a lower export rate, is not properly an advance, and that the advances in rates on dressed meats ought not to be condemned under the peculiar circumstances surrounding that traffic.

To fortify its declaration that the railroads' financial condition does not demand an increase in rates, the Commission gives figures from recent annual reports of some of the roads. The report says:

The railroad company first named in the order is the Michigan Central. That company owns 270 miles and leases 1,387 miles, making a total operated mileage of 1,657 miles. Its funded debt is $19,545 per mile. Its outstanding capital stock is $18,738,000, or $69,382 per mile, making a total capitalization of, approximately, $90,000 per mile.

The attorney says that in the past this company had paid a dividend on the average of about 4 per cent. upon this stock, and that in his opinion it should make such earnings as would enable it to continue payment at that rate in the future. We agree with him that the capitalization of this company is not excessive, and that it ought to pay its stockholders at least four per cent. upon their investment. Can it reasonably expect to do so without an advance in its rates?

Assuming that the stockholder is only entitled to exact from the public a certain amount for the performance of the service, he clearly has no right to both receive that amount in dividends and add to the productive value of his property. The policy of the Michigan Central has been to make improvements, not by adding to the debt or the capital stock of the company, but out of its gross earnings as a part of the operating expenses. In this case it has been rebuilding and adding to the value of its road. The company is during these years of prosperity laying by in the best possible form a fund which will tide it over any future period of adversity.

If its accounts had been kept as those of most railroad companies are, and as they should be in order to make a fair exhibition of this matter, it would appear, upon its own showing, that for the last three years it had earned, not 4 per cent. upon its capital stock, but from 10 to 12 per cent. It is apparent that this company, without any advance in rates beyond what are sanctioned by this report and will accrue from a maintenance of the published schedule must earn from two to three times the dividend which it has in recent years paid its stockholders.

The Lake Shore & Michigan Southern, after paying a seven per cent. dividend has a surplus each year sufficient to buy the control of a very considerable railroad. Before holding that its revenues ought to be further increased or that the government ought not to exercise any supervision over those revenues, it may be well to consider what the bearing of this process continued for half a century is to be upon two of the great economical problems before us—namely, the distribution of wealth and the control of the avenues of transportation.

The financial showing made by the New York Central is less satisfactory in some respects than that of the two members of the Vanderbilt system already examined. The New York Central owns $16,814,300 of the capital stock of the Michigan Central of which the entire amount outstanding is $18,738,000 and also owns $45,289,200 of the $50,000,000 of the capital stock of the Lake Shore & Michigan Southern.

We have seen that the Michigan Central is earning and will continue to earn under present conditions, without any advance in rates, from ten to twelve per cent. upon its capital stock, of which it pays four per cent. in dividends and adds the balance to its property; that the Lake Shore after paying a dividend of seven per cent. has remaining, upon any correct system of bookkeeping, a surplus of from $3,000,000 to $5,000,000 per year. This belongs to the stockholders of the New York Central and adds permanently to the value of their stock if they prefer to leave it to accumulate rather than to take it in dividends.

The income of the Pennsylvania Railroad from all sources for the year 1902 was $46,832,530, of which $37,852,506 was from operation. After paying its interest, rents, taxes and a dividend of 6 per cent. upon its stock, there remained a surplus of more than $11,000,000, which seems to have been devoted to the permanent improve-

*See *Railroad Gazette*, April 10, 1903, p. 265.

ment of the property. This company in the past has paid no rebates of consequence. It makes no answer whatever to this question in its annual statistical report. In answering our inquiry as to the amount of rebates paid during the fiscal year 1902 it is stated that this was approximately $110,000. It is extremely gratifying, and somewhat surprising, to know that this railroad has been able to keep itself free from the demoralization of rates which has existed among its rivals. The Pennsylvania Railroad Company is, however, abundantly able, independently of gain from this quarter, to meet the increase in its pay roll from other sources. It could during the year 1902 have paid its employees $6,000,000 more than it did, paid its stockholders the dividend which it did and still have had a surplus of nearly $6,000,000 remaining.

Increase in Soap Rates Condemned.

The Interstate Commerce Commission in an opinion by Chairman Knapp, has announced its decision in the case of the Procter & Gamble Company against the Cincinnati, Hamilton & Dayton and others. The Commission holds as follows:

The presumption as to the reasonableness of rates long kept in effect by carriers as a voluntary act on their part does not attach in a case where such rates have been established by the carriers in compliance with a decision and order of the Commission.

Profits secured by complainant from the operation of a railroad connecting with the defendant lines and from other special advantages tending to diminish the amount of its transportation expenses would have very material bearing if the sole question involved was the reasonableness of rates charged to complainant, or if the rates exacted from it were drawn into comparison with those charged to competing soap manufacturers; but where, as in this case, the chief question is as to the justice of a change in classification of soap, not only as regards complainant, but as affecting all soap shippers in the classification territory, no order could be made respecting such change in favor of complainant which would not apply with equal force on shipments of other soap manufacturers in that territory; and as the case mainly involves the general question of classification, it must be decided in accordance with the principles which properly govern the classification of freight articles.

The action of defendants in placing soap in carloads, with common grades of grocery and other general merchandise, in the fifth class and refusing to reduce soap in carloads to the sixth class, which includes only low grade freights, is held not to be unlawful while other articles with which carload soap is properly compared are retained in the fifth class; but this shall not operate to preclude the Commission from holding in an appropriate proceeding that fifth class rates in this territory are excessive.

The privilege of shipping small quantities of articles in the same class, as a mixed carload, is valuable to a great many shippers and is not to be condemned because it may result in some degree to the advantage of particular manufacturers or to jobbers; but when it appears, as in this case, that shippers like complainant are subjected to additional disadvantage under the operation of a mixed carload rule through the increase in a long-standing less-than-carload rate, the effect of that rule is properly to be considered in determining the reasonableness and justice of such increased rate.

The action of defendants in increasing the classification of soap in less than carloads from fourth to third class was unreasonable and unjust under the Act to regulate commerce, and their subsequent practice of applying 20 per cent. less than third class rates on such traffic is also unlawful.

New York Franchise Tax Law.

The New York State Court of Appeals has handed down a decision, prepared by Judge Vann and concurred in by all of the other six judges, sustaining the law of 1899, taxing the franchises of street railroads, gas companies, telegraph and telephone companies, and other public service corporations occupying streets and public places. Under this law the corporations of New York City have been taxed annually for the last three years about five millions of dollars more than under former laws, and the constitutionality of the Franchise Tax law was early challenged in the courts. By an amendment passed in May, 1899, at a special session of the Legislature, the power to appraise franchises is vested in the State Tax Commissioners, and this clause, preventing the local assessors from performing this function, was the basis of the principal argument in the suits to annul the law, the claim being that local self-government was denied. The Appellate Division of the Supreme Court, Third Department, by a vote of three to two sustained this view, declaring the law unconstitutional, but the Attorney-General of the State appealed, and this decision has now been reversed. In the present opinion Judge Vann says that the principle of home rule for cities and towns is conceded, but that in this case the Legislature, seeking means of more equitably distributing the burdens of taxation, found property scattered about the State valued at at least $200,000,000 in the way of special franchises in the possession of public service corporations, which were not and never had been taxed. This property they included in a new system of taxation, laying upon the State Board of Tax Commissioners the duty of its valuation. This the Court holds the Legislature had indubitable right to do.

"This property was not local and did not fall within the ordinary taxing scope of county, city, town or village. Moreover, it was of a new and peculiar class of property, requiring peculiar experience and knowledge on the part of the assessing officials.

"The Court denies the argument of the corporations, that the franchises of a consolidation of corporations should have been assessed separately, since they derive their highest, if not their only value, from the combination of all into single enterprise. The Court declares that it cannot sustain the contention of the corporations that the law involves impairment of contracts in violation of the federal constitution, nor that it is impracticable of fulfilment, nor that the franchise cannot be accurately valued, nor that the Tax Commissioners formulated no rules for valuation, nor that the corporations did not have a fair hearing and adequate review, nor that this taxation takes their property 'without due process of law.' The Court pays high tribute to Judge Earl, who, as original referee in the case, formulated the now prevailing view of the constitutionality of the law."

Officials of New York City say that the taxes which have been assessed under this law and now remaining unpaid aggregate about 15 million dollars, and the companies taxed also owe about three millions interest on this sum. If the valuations on which these taxes are based had not been sustained the borrowing power of the City of New York would have been about 22 millions less than it now is, the total valuation being about 220 millions.

The lawyers of the New York City corporations say that the suit will be appealed to the Supreme Court of the United States.

The Locomotive Steel Frame, and Its Repairs.*

If compression, tensile and torsional strength were the only requisites of a perfect material for locomotive frames, steel would indeed be the ideal metal, but where shocks and vibrations are factors, there is danger in its use. If it were possible to combine the highest tensile strength of steel, and the ductility of good fibrous iron, the problem of not only a proper, but the best material for frames and many other parts of locomotives, coaches, cars, etc., would be solved.

In casting a locomotive steel frame, owing to its length and irregular shape, it is necessary to gate or pour the metal at several points. Does this metal retain the proper temperature or fluidity, after traveling from 4 to 6 ft., as the case may be, to form a perfect union with the same metal at the same temperature from the next or neighboring pour? This would be possible when pouring large volumes of metal, if the pour be constant, but can we have perfect faith in the union of such metal when poured at intervals of 4 to 6 ft. into a mould with a sectional area of only 16 to 25 sq. in., owing to its tendency to cold-shut at the point of supposed union?

Invariably it is necessary, when casting ingots, to cut from them what is called the piped end, which is largely dirt and other impurities in the steel, which settles at the top. If this is necessary in order to procure a perfect or sound billet from which, through lamination a solid bar of refined steel can be produced, what are the conditions of this metal in a steel frame with these imperfections and impurities uneliminated, and distributed throughout the frame? Many broken steel castings that come into the shop have a cavity at the point of breakage, around which can also be seen the impurities in the steel.

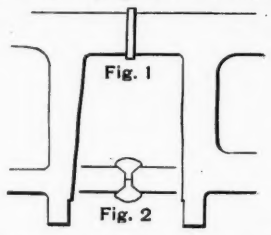
Some steel men say that castings made from open-hearth steel, containing a specified percentage of carbon, do not run regular throughout in carbon. A frame made to specifications calling for 30 point carbon, is liable to contain 30 at one end, with 20 at the other end and 15 in the middle, which would make a frame of an unknown quality at any given point, with possibly its weakest section where greatest stress or abuse is to be met. I have been told by men who have straightened many steel frames under the steam hammer after they were annealed, that they sometimes break in two in the middle by a blow from the hammer; others will break off near the end through shock or jar, but this is not surprising in view of the fact that steel ingots sometimes crack in two or three places, due no doubt to internal as well as external strains, caused by uneven shrinkage.

Some might ask, will a given number of steel frames show a greater number of breakages than the same number of good fibrous iron frames, doing the same service under similar conditions? On one of our neighboring railroads, they have had within the last six months 35 steel frames break on their consolidation engines while only one wrought iron frame has broken.

How shall we repair this broken steel frame? I know but one proper way, that of laying in, the side "V" weld, sometimes called the angle weld. In the preparation of parts for this style of weld, the sides of the frame at the point of breakage should be driven well back. This weld is generally made at an angle of 90 deg., but an angle of 110 deg. is better, as it requires a longer lap to make a secure weld in steel than it does in iron, and with the obtuse angle, the piece laid in is less liable to slip.

In welding broken steel frames and iron frames as well, the lay-in pieces are usually made of iron, and the fiber should always run with the fiber of the broken part. This style of weld made with a clean heat, we do not think can be excelled, but it should be remembered that any weld made with dirty or sulphurous fuel, is a counterfeit, and cannot be guaranteed. Blacksmiths frequently resort to butt welding the steel frame, and by so doing entirely disregard the nature of the material, as well as the fact that a slow compressive force will not make a perfect weld, and even undertake to butt weld without removing the frame from the engine. The best weld of any style requires a rapid succession of blows.

The method of butt welding the steel frame without removing it from the engine consists of separating it at breakage and inserting a piece of wrought iron, which should protrude from ½ in. to 1 in. on the four sides of the frame (Fig. 1). A furnace from 8 in. to 12 in. sq. is then built around the broken parts, and air and oil used as fuel. When the broken part arrives at proper welding heat, if it is impossible to use a battering ram, which is generally the case, the frame is pulled together at the weld with screw rods, or by some other equally slow means. The parts are dressed up with light hammers. A combination of the angle and butt weld would be preferable (Fig. 2). The metal encased in the furnace for the purpose of heating is brought to the same high heat required to effect the weld, and the metal of granular or crystalline structure is left in a spongy, as well as over-heated condition, which, through lack of hammering or lamination of any kind, is weakened for service. If there were no impurities and defects in the frame, and it should break through the solid, how can good results be obtained from a weld with a tensile strength of only 60 to 80 per cent. of the original. The lap or angle weld is the only weld that can be guaranteed to approach the initial strength. The proper place to repair frames is in the blacksmith shop under the steam hammer or on the anvil, making the best weld known, paying strict attention to expansion and contraction of all the parts.



*Extract from a paper presented before the Pittsburg Railway Club, April 24, by A. W. McCaslin, Master Blacksmith, Pittsburg & Lake Erie.

Colonel Yorke's Report on American Signal Practice.

[By Mr. Charles Hansel, Member of the American Society of Civil Engineers, and Vice-President of the Pneumatic Signal Company.]

Referring to the report of Lieutenant-Colonel H. A. Yorke, R. E., Chief Inspecting Officer of Railways, of the Board of Trade of England, of December 6, 1902, and more particularly to that portion bearing on automatic signals, Colonel Yorke says: "It must be borne in mind that a fundamental difference exists between manual signals and automatic signals, in that the former have human agency and human intelligence behind them and convey a direct order to a driver as to what he is to do, whereas the latter merely tell him the line is clear for a short distance ahead."

This is obviously an inaccurate comparison. A visual signal conveys its meaning and significance by form, position or color, or all of these combined. It certainly does not interest the locomotive driver to know what power is used or the kind of mechanism involved in operating the signal, because he takes his orders from the position of the signal by day and its color by night, and its indication authorizes him to advance, proceed under control or stop. The locomotive driver does not feel any special sense of security because he may happen to know that the signal is manipulated by human agency, for he knows from everyday experience that this agency is not infallible.

Many accidents have occurred in England through the mistake of the signalman admitting two trains into the section at the same time, and unless the human agency is supplemented by some device which protects it against its involuntary acts or errors of judgment, the liability of giving false indications with the manual system of block signaling will continue.

The automatic block system gives the same direct order to the driver as does the manually operated signal, and experience has demonstrated that this order is given by the automatic system with greater accuracy than by any human agency. We must admit that it is not at all probable that any system of signaling will be perfect in its operation at all times. Admitting this, we should select the system which gives the greatest measure of safety. The operation of automatic block signals in the United States has demonstrated to the satisfaction of the majority, if not all, of the operating officials of railroads, that the automatic system as now designed and installed is much less likely to fail than any system of signaling operated by human agency, even though it be supplemented with the continuous track circuit, which adjunct is not provided in England. Colonel Yorke has certainly not specified the full scope and value of the automatic block signal system when he says: "Whereas, the latter (automatic signals) merely tell him (the engine driver) the line is clear for a short distance ahead." In all complete installations of automatic block signals the locomotive driver has definite information concerning the condition of two full block sections in advance.

Paragraph 2, page 6, of the report says:

"Goods trains of great length are now coming into use, and they are not infrequently as much as eight hundred yards long. With trains of such dimensions the intervals of space between two trains may, if block signals

are only one thousand yards long, be as small as two hundred yards which, except at very low speeds, cannot be regarded as adequate." It is, indeed, a surprise to know that the length of a train has anything to do with the protection offered by automatic block signals be they spaced ever so close. The automatic block section is not clear until the last pair of wheels in the train has passed out of the section, and if such a train covered two or ten blocks, it would be as fully protected from the rear as if it contained but a locomotive and one brake van. If we follow the reasoning of Colonel Yorke, we might have trains overlapping each other.

The average length of block sections for automatic signaling in the United States, as stated in this report, is one thousand yards, and it is further stated that "the only reason I have been able to discover for the introduction of such short block sections is that track circuits do not work well on sections of greater length." A closer study of the actual conditions would have shown Colonel Yorke that the length of block sections is determined solely by the business of the railroad instead of the limitations of track circuit; and if he but took the trouble to inspect the first and only installation of automatic block signals between Andover Junction and Grately on the London & South Western Railway, he would have discovered that the block sections on that line are a mile in length. This system of automatic signals was inspected by the officers of the Board of Trade, accepted by them and brought formally into use on April 20, 1902, and so satisfactory has it been that the directory of the London & South Western have contracted for the installing of this system between Woking and Basingstoke, a distance of 23 miles; and other companies in England are preparing for similar installations. It is not necessary to leave England to study and appreciate the value of the automatic block system, and if it is desired to space the automatic signals farther than a mile there is at least one signal company in England, the British Pneumatic Railway Signal Company, which will guarantee to space the blocks to accommodate the business, be they more or less than a mile apart.

Colonel Yorke seems to feel that on account of climatic conditions in England there is a difference between the significance of automatic signals and manually operated signals, and that therefore there would be much difficulty experienced in "fogging." Since the general practice in England is to provide separate apparatus for handling detonators, the necessity of providing fogmen is no more apparent in the automatic system than in the manual. Climatic conditions in England are more favorable to the operation of track circuits than is the climate in the United States, and since automatic signals have operated successfully in the United States for at least 15 years, we should have no fear of their failure to operate in England. The satisfactory control of the movement of trains by the automatic block system has long since passed the experimental stage, and there is, in fact, no condition of climate or traffic that this system cannot meet more satisfactorily than any known system of signals operated by human agency. If the testimony of the foremost railroad officials of the United States who have had experience with all forms of block signaling is of any value, we must concede the superiority of the automatic; because this is the system which takes first rank in the estimation of these officials. It has the approval of the American Railway Association, a society composed of the highest officials of the railroads of the United States. I do not know of any contemplated installation of the manual system of complete block signaling in the United States, whereas there are many hundred miles of automatic block signals under contract.

The Bagdad Railway—The British View of It.*

There is too much reason to fear that Germany is skilfully jockeying us in regard to the Bagdad Railway scheme. It is not the first time we have expressed this view, and the course of events is amply proving the truth of our predictions. The broad facts of the case are tolerably well known. An overland route to India has long been the dream of English engineers, and the Ottoman Railway from Smyrna to Aidin—a purely British enterprise—afforded an excellent nucleus. The scheme fell through for two reasons. Our Government would not take it up because of the difficulty of guarding the line in time of war, and the Ottoman Railway directors, though they applied for extension concessions to the Euphrates Valley, hesitated to stoop to the financial expedients absolutely necessary to oil the wheels at the Porte. Then the Germans came on the scene at the back of the Anatolian Railways. They practically swallowed up the Cassaba line and made a desperate effort to nobble the Ottoman Railway. Backed by the German Government they have secured a guarantee for the extension to the Persian Gulf, but to allay the political irritation of the Russian Government and to wheedle the English Government regarding an increase in the Customs tariff wherewith to furnish the railway guarantee, it is studiously given out that the whole scheme is to be an international concern; that the German Government has nothing to do with it, and that France, Austria and England will have the right to participate in the capital on equal terms. For the past couple of years the subsidized press of Europe has been fed with inspired paragraphs to this effect, and even Mr. Balfour, in the House of Commons, to ward off the pungent and quite justifiable criticisms of Mr. Gibson Bowles, professes to swallow these mock professions with confiding relish. Now, the plain facts are that the Bagdad Railway will be German, stem and stern. It will be the creation of the Ottoman Bank and the Deutsche Bank cliques, with the Kaiser as the chief wire-puller and patron. No matter where the capital be found the control will be German; no matter what the nationality of the directors they will be the creatures of the German promoters. The fact of the proposed terminus being on the Persian Gulf, within our sphere of influence, affords no guarantee for us whatever. The Germans do not want to invade India. They want a foothold in the sick man's territory, and the railroad minus the terminus will answer all their purposes. It will give access to Asia Minor. They want our capital, if they can get it; they want our mail contracts, which would mean business; they want to tax our merchants to provide the railroad guarantee, but as for control there would be six English directors of a safe and well selected sort out of thirty. They ask us to find our share of the 18 millions sterling which the 1,800 miles from Konieh to Koweit will cost; in other words, to provide a rod for our own backs, since the railroad in hostile hands would seriously menace our interests in Persia and in India, and could be of no earthly advantage to us in time of war unless we had Germany as an ally, a contingency very much removed from the orbit of existing international probabilities. We offer these remarks in no querulous spirit. Our Government neglected the opportunity of securing an overland route of its own to India, and a purely dog-in-the-manger policy is of little use either in politics or in business. What we do object to is the jockeying chicanery, lying and deception indulged in by Germany and the German cliques all through this business. They rate our gullibility at a very low level. We hope the manœuvring will not go so far as to inveigle British investors. The bonds will absolutely rest on the credit of the Turkish Government. Those who like that security can take it. The railroad as a commercial enterprise will not go near paying working expenses. There are fertile patches along the Euphrates Valley, but for the most part the line will traverse arid wastes hopelessly desolated by the blight of Mohammedan conquest and occupation.

*From *Herapath's Railway Journal*, April 17.

The Enlarged Spring Department of the Brill Plant.

A large building has been added to the plant of the J. G. Brill Company, of Philadelphia, to accommodate the growing spring department. The company began the manufacture of springs merely to supply its own cars and trucks, but the steady increase of outside orders pointed the way to enlargement. Since the new building was finished many of the machines have been displaced by newer and larger types, so that now the company has one of the most complete spring making plants in the country for all kinds of car and locomotive springs.

Interior of Brill Spring Shop.

The building is a substantial brick structure, with a standard gage track through the center connecting with two railroads. The shop is well lighted and ventilated. Fuel oil, for the 12 oil-burning furnaces, is stored in underground tanks outside the building. The equipment includes one Olsen hydraulic testing and calculating machine, capacity 100,000 lbs.; one hydraulic testing machine, capacity 100,000 lbs.; one large automatic coiling machine; one small coiling machine; one hydraulic banding machine; one 100,000-lb. hydraulic shear; two tapering rollers for elliptical springs and one for helical springs; one combination punch and shear; one eye back; one nibbing machine, and one bending machine, all of latest type. There are also numerous fitting and dressing tables, and tempering tanks. A blacksmith shop is a part of the equipment.

The spring department has one advantage in the fact that a finely equipped machine shop is in the plant. Machinery is there made according to special designs for special work, and any unusual spring pattern can be made. Every spring before it leaves the shop is compressed at least three times to insure its coming up to the specified standard. The work is under the direction of men of long experience in all types of springs used in steam railroad practice, and each workman in the shop is the best of his class that can be obtained. A large stock of steel in all the standard sizes is always on hand, and the grade is that known as the "Pennsylvania Railroad standard analysis and test."

Development of British and of American Railroads Since 1891.

The *Railway News* (London) prints the British side of the accompanying table, showing percentages of increase in capital, mileage, traffic and equipment of the railroads of the United Kingdom, from 1891 to 1901. For purposes of comparison, a table showing similar percentages for all steam railroads in the United States has been prepared, using as a basis the figures given in Poor's Manual. The figures for the two countries compare as follows:

Year 1901 Compared with 1891.

	—Increase, per cent.— Great Britain.	United States.
Capital stock	18	25
Miles of road	9	16
Locomotives	29	41
Passenger cars	27	17
Freight cars	26	21
Train miles	23	10
Tons of freight	34	54
Gross passenger earnings	33	34
Gross freight earnings	23	49

It is obvious that conclusions drawn, back and forth, between parallel columns of increased percentages like the above, would be of little value, since they would take no account of the conditions existing either at the beginning or at the end of the period considered. But it is possible to compare relatively the changes indicated within each of the columns. Thus, in Great Britain, it required a 26 per cent. increase in number of freight cars to carry a 34 per cent. increase in tons of freight, while the American increase of 49 per cent. in tons of freight hauled in 1901, was handled with only 21 per cent. more cars than existed in 1891.

Abolition of Brooklyn Grade Crossings.

A bill just passed by the New York Legislature and now in the hands of the Governor, provides for extensive changes in grades of portions of the New York, Brooklyn and Manhattan Beach Ry. Co., leased by the Long Island R. R., and of the Brooklyn Union Elevated Co., leased by the Brooklyn Heights R. R., so as to abolish approximately 150 grade crossings. The "Bay Ridge improvement" consists in the depression of the Manhattan Beach track from Bay Ridge, the western terminus of the road, to the line dividing the boroughs of Brooklyn and Queens, about five miles. In the "Brighton Beach improvement" the line is to be alternately depressed and elevated from its present northern terminus at Fulton street and Franklin avenue, to its southern terminus at Brighton Beach, about seven miles. A board of five commissioners, to be known as the Brooklyn Grade Crossing Commission, is to be appointed by the Mayor. One member must be appointed on the written nomination of the President of the Long Island road, one on the written nomination of the President of the Brooklyn Heights, and one must be a civil engineer. This board is to make an estimate of the cost of the proposed improvements, and this must be approved by the Commissioner of Public Works in the Borough of Brooklyn. Preliminary plans have been drawn, and the city and the railroads have practically agreed, so that the commission will be able to begin work without delay. The city is to pay one-half the cost, but the bill limits the expense to the city of the Bay Ridge improvement to $2,500,000, and of the Brighton Beach improvement to $750,000, exclusive of the removal of water mains made necessary by the change in grade. The city is to issue corporate stock to pay for its portion of the cost.

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EDITORIAL ANNOUNCEMENTS.

CONTRIBUTIONS.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

ADVERTISEMENTS.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and these only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.*

The Cost of Repairs of Large Engines.

Surely the cost of maintaining a locomotive weighing 100 tons greatly exceeds the cost of maintaining a machine weighing but 50 tons, for such is in the nature of things. Similarly, the chances of failure in active service are somewhat in proportion to the maximum tractive effort which is exerted. If comparisons are made between the cost of repairing a heavy and a light engine the figures will be unfavorable to the large machine, but the proper and equitable basis for comparison is the cost of repairs per locomotive per unit of work done. The report of the Atchison for 1898 shows that $2,042,660 was spent for repairs to locomotives. During that same year the total freight ton mileage was 2,779,555,249, and the number of locomotives was 1,036. Dividing the cost of repairs by the product of the ton miles and the number of locomotives shows that the cost of repairs per locomotive per million ton miles was 70.4 cents. In 1902, five years later, the cost of repairs as given by the report was $3,712,198 and the ton mileage hauled was 4,231,748,520; the total number of locomotives being 1,312. A similar calculation for 1902 shows that the cost of repairs per million ton miles was 66 cents per locomotive, an actual decrease of 4.4 cents as compared with 1898. This saving is quite significant in view of the fact that during these five years the Atchison has replaced much of its old and light equipment by very heavy modern engines. In fact, this road has a number of locomotives that are heavier and more powerful than those used by any other road in the world. Figures taken from reports must be viewed with some caution, but they indicate, nevertheless, the line along which comparisons should be made.

In an address before the students of Purdue University in 1900 Mr. Waldo H. Marshall, the then Superintendent of Motive Power of the Lake Shore, said: "Sometimes an engine of the maximum weight allowable under existing conditions may be needed to obtain increased revenue out of which to pay for the bridges and track that will carry a still heavier engine. But if the finances will permit it the spirit of conservatism should not prevent the transition by a single step to the most powerful engine the road can use. Unless the physical condition of the road establishes other limits, I would say as a general proposition that the road should not only build the largest engine that can be used advantageously to-day, but, if possible, should meet the conditions that will prevail in the future, say five or ten years from to-day." That is to say, it is true economy to use the large engine at once, and not have it undergo a gradual process of development, for if changes and improvements are necessary, the increased earnings which are possible by the use of heavy train loads will assist in paying for the betterments. The statement that the heavy locomotive is ahead of the times is only true when considered relatively to the condition of bridges, roadbed and repair shops. A proper statement would be that the permanent way is behind the times.

Failures of large locomotives are due to improper design of the details or lack of proper care after being put in service and not to inherent defects in the type. The development of the modern engine has been along the line of increased boiler power and the efforts to increase the size, and hence the weight, of the boiler, have resulted in a decrease in weight of the other details, in order that in each case the total weight should not exceed a fixed limit. Cast steel, by reason of its greater strength, has been substituted for cast and wrought iron. Insufficient attention has been paid, however, to the design of the frames of large engines. At best the nature and magnitude of the stresses in the frames cannot be accurately calculated and the large engine complicates the problem. Long diagonal cross braces between the two frames so as to increase the rigidity in a horizontal plane, would add to the strength and also relieve the cylinder castings from much of the severe twisting which occurs in passing over rough tracks or in rounding curves.

The future development will be largely in improving the details so that failures in service will be reduced. Increased facilities must also be provided for the economical and expeditious repair when failures occur and in this most roads are seriously lacking. It is quite possible that radical changes may be made in the general design. It may be necessary to send the power through more than one pair of driving axles and crank pins, as is done in the de Glehn four cylinder compounds. It is quite certain, however, that such advances will not be made until the heavy locomotive has been thoroughly tried and its weak points brought out. In its perfected state it is quite possible that the actual cost of maintenance of the heavy locomotive will compare favorably with that of the smaller machine. When working at less than maximum power the large locomotive will be forced to a lesser extent than the smaller machine hauling the same load, and hence the wear and tear will be less and the efficiency and life of the boiler will be increased by reason of the lower rate of evaporation.

Electric Railroad Financiering.

With the one exception, perhaps, of the rapid physical expansion of electric railroads during the last decade the most impressive fact in their development has been their loose and inflated financiering. Railroads built by the minimum of cash and the maximum of securities, bonds floated and shares bonused, consolidations masking new and large capitalization—these have been too familiar terms in electric railroad history and parlance. The evil—baneful alike to the investor seeking earned dividends and to the traveling public demanding better service—has probably now passed its climax, partly through exhaustion of the best electric railroad territory, partly through a more aroused and resistive public sentiment. But the question of future prevention still remains an important one and, in statutory aspects, at least, offers its promising field of local study. Such a field is Southern New England, where the relations of the three States of Massachusetts, Connecticut and Rhode Island to street railroad finance, their laws bearing on the subject, the contrasted functions, duties and policies of railroad commissions, and the results as set forth especially in official returns supply some instructive facts.

The State of Massachusetts adopted early the theory of a high class and well paid commission vested with large powers over steam railroads, and most of those powers were extended later to electric railroads. Privileges, in many States granted only by special legislation, in Massachusetts abide in the Commission. That body fixes the amount of capital stock—not to be greater than replacement cost of the road and its property less outstanding mortgages; and has applied the "replacement cost" test pretty rigidly. Issues of new stock and bonds, for such purposes as, for example, the purchase of pleasure grounds, are also subject to the approval of the Commission, which, in fact, has, in practice, general purview of the whole subject of capitalization. As to general restrictive statutes we find in Massachusetts laws forbidding consolidation if stock and bonds are increased in consequence, and ordering that new stock be sold at not less than market value. Here again the Commission is given power to fix the price at which the new stock may be sold.

The results of this conservative policy of the State are best expressed in the table annexed showing total cost per single main track mile and capitalization, in stock and debt, of Massachusetts electric railroads for each of the last 10 years:

Year—	Total cost per mile.	Capitalization per mile.
1893	$53,986	$53,367
1894	53,632	52,293
1895	48,729	49,120
1896	46,041	46,373
1897	44,458	44,683
1898	43,229	44,958
1899	42,979	45,040
1900	43,637	44,273
1901	44,297	45,757
1902	45,410	46,261

Suggestive points in the table are (1) the low absolute capitalization of the Massachusetts system, especially in view of the large mileage in cities of the State and the cost of the Boston elevated structures, and the track and equipment of the subway. (2) The diminished mileage capitalization as compared with the early part of the decade, partly accounted for by some temporary devices of stock watering which were pointed out by the commission some 10 years ago and quickly checked. (3) The fact that the diminished capitalization has been synchronous with mergers which have absorbed some 93 companies. During the decade single track mileage in the State has increased from 874 miles to 2,591 miles; capital stock from $23,590,536 to $60,036,328; and gross liabilities from $53,020,295 to $119,441,792, indicating the size of the fiscal problems with which the potential commission of the State has had to deal and has dealt with so successfully that it may be almost said to have fixed a standard. Tokens of its work are the exemption of the electric roads of the State from exploitation by outside syndicates and so conservative financing of the properties that certain of their bonds are open to savings bank investment.

The sister State of Connecticut offers a striking contrast to Massachusetts. As regards excessive stock capital the statutes are almost mute, and "special charters" with large privileges have been given right of way. The railroad commission, while vested with considerable authority in such matters as layout, equipment, roadbed and details of operation has been legally powerless in checking over-capitalization. Public sentiment on the subject until lately has been lethargic, and the Legislature inert; and while electric railroad inflation has gone on apace, the commission has neither pointed out the evil nor asked for larger powers. No company, in the language of the statute, may have bonds outstanding at any one time to a greater amount than 75 per cent. of actual cost of construction as certified to the State Comptroller by the president of the company, its treasurer and a civil engineer. This bonding ratio is reduced to 50 per cent. for companies chartered since 1895, and the Comptroller is explicitly forbidden to register bonds in violation of this law. But the statute, in a State much exploited by the outside syndicates, has in practice been systematically dodged, partly by special legislation, while a custom of allowing the Comptroller 25 cents on each bond of $1,000 registered at his office has not tended to abate the evil of liberal bond issues. During the last eight years, which comprises the whole period during which returns have been made to the commission, the subjoined table shows the outstanding capitalization per single main track mile in stock, bonds and floating debt combined:

Year—	Single main track miles.	Capitalization per mile.
1895	300	$59,167
1896	329	56,139
1897	362	55,065
1898	387	54,863
1899	416	59,260
1900	471	50,062
1901	492	81,897
1902	517	83,151

The reduced capitalization in 1900 is accounted for chiefly by a merger in which high priced shares were exchanged each for several low priced shares of an absorbed corporation. The greatly increased capitalization of the last two years—from $23,578,146 to $42,989,162 with an increase of but 46 miles in trackage—was due mainly to a "bond and bonus" operation applied to a large syndicate property. But it stands as an accomplished fact in Connecticut street railroad polity, and it encountered no resistance and not much comment.

Rhode Island in her fiscal street railroad policy is even further away from Massachusetts than Connecticut. The laws restricting capitalization are brief and lax, and the "special charter" has generally controlled it. The State has but a single railroad commissioner, paid the low salary of $1,000 a year up to the year 1900, and $2,500 a year since, whose general powers are few. He has had a certain authority in controlling new capital of companies accepting a State tax law, but the function has been mainly theoretical. The railroad commission blank of the State is defective and the returns are meagre, but by separate investigation of the annual reports they supply the following table for the decade:

Year—	Single main track miles.	Capitalization per mile.
1893	98	$44,731
1894	139	42,307
1895	143	37,767
1896	157	72,694
1897	161	72,342
1898	189	64,678
1899	213	59,697
1900	248	84,645
1901	316	74,294
1902	346	78,953

The sudden leap in the figures for 1896 and again for 1900 will be noticed with its obvious suggestion of two inflated recapitalization schemes of syndicates. In 1896 total capitalization, with an increase of but 14 miles of trackage, rose from $5,400,675 to $11,412,873, and in 1900, with an increase of but 35 miles of track, it rose again from $12,715,534 to $20,992,054. And we look in vain for criticism or comment in the Rhode Island Commissioner's report for those years.

The annexed table brings into closer and more vivid comparison the returns for electric railroad capitalization per single main track mile in the three States:

Year—	Mass.	Conn.	Rhode Island.
1893	$53,367	...	$44,731
1894	52,293	...	52,307
1895	49,120	$59,167	37,767
1896	46,373	56,139	72,694
1897	44,683	55,065	72,342
1898	44,958	54,863	64,678
1899	45,040	59,260	59,697
1900	44,273	50,062	84,645
1901	45,757	81,897	74,294
1902	46,261	83,151	78,953

In the broader outlines of the subject of these three States forming one geographical group, Massachusetts may be described as a State with good capitalization laws, with a railroad commission of high standing and powers, and with statutes systematically enforced; Connecticut as a State of fair capitalization laws, a commission of low powers, and statutes too commonly evaded; and Rhode Island as strong neither in capitalization laws nor in her commission powers. The experiences of the three States, as interpreted by the returns, have their rich fund of contrasted suggestion not merely as to the fiscal efficacy of State law, but as to the personnel of railroad commissions and their immunity from politics in times when the relation of the carrying corporations to the State and its interests has become of so great and still waxing importance. If in two New England States the experiences have been negative and sombre, in another commonwealth her more cheering example, at least, shows what is possible.

The monster freight steamers for the Great Northern Railway, one of which was launched lately at New London, are doubtless calculated to carry enormous cargoes great distances at the lowest cost ever reached by steam navigation. But it is easy to forget that indispensable to the economy are enormous cargoes regularly available for a single port. The object of these vessels is said to be to secure the traffic of "the Orient" for the Pacific route. Now "the Orient" is not one place, by any means; even from Yokohama to Hong Kong the distance is 1,800 miles, and if the shipments are not delivered directly to Yokohama, the dying Vladivostock, or the rising Dalni, Tientsin, Shanghai or Hong Kong, there must be a transhipment, with an extra handling of freight; and if the big steamers do deliver directly at all or most of these ports, they must be tied up in port for a considerable time; which for vessels of such size and cost means large sums for interest and expenses. Further, it is 4,000 miles from Hong Kong to the chief Australian ports, as far to Bombay, and about 2,800 to Calcutta, all of which are "oriental" and have a great commerce. A "tramp" service, without much regard to regularity, perhaps could secure cargoes to and from these places; just as now the drought in Australia, lasting some years, has made it an important market for Pacific coast wheat this year; but for general traffic with regular sailing days, it remains to be proved whether the gigantic vessel can compete with those of more moderate size, able to secure a pretty full cargo for a single destination at regular and pretty frequent intervals. The six and seven-masted sailing vessels recently built, which were to carry coal at an unheard of low cost, are said to do almost all that was expected of them except to get full cargoes.

The description in another column of the de Glehn 10-wheel locomotive recently built by the Swiss Locomotive & Machine Works of Winterthur for the Jura-Simplon permits of a comparison of Swiss and American practice. The Swiss engine was designed to haul a train of 300 metric tons, on a road with numerous curves, up a grade of 1 per cent. at 31 miles an hour. In the Baldwin Locomotive Works Record of Recent Construction No. 11, March, 1899, is an account of a Vauclain compound 10-wheeler built for the Fitchburg to haul a train of 325 tons on a grade of 60 ft. to the mile with many curves. An examination of the following table of the principal dimensions and ratios of these two locomotives shows a close resemblance.

Road	Fitchburg	Jura-Simplon
Builder	Baldwin	Swiss Loco. Co.
Weight of engine, total, lbs.	149,300	141,100
Weight on drivers, lbs.	110,600	105,800
Cylinder diameter, h. p., in.	15	14 5/32
Cylinder diameter, l. p., in.	25	22 7/16
Stroke, in.	26	23⅝
Driving wheel diameter, in.	78	70
Boiler pressure, lbs.	200	213
Cylinder tractive effort (Vauclain formula), lbs.	20,200	18,600
Total heating surface, sq. ft.	2,748	2,670
Grate area, sq. ft.	34.5	29.2
Ratios—		
Adhesive wgt. to tractive effort	5.48	5.69
Tractive effort to htg. surface	7.35	6.96
Htg. surface to grate area	79.8	91.5
Tl weight to heating surface.	54.3	52.8

The only great difference in proportion is the relatively smaller grate of the Swiss engine. The heating surface which so often in European locomotives appears disproportionately small, is in the present case fully up to the American standard, showing, in fact, a slightly higher proportion in relation to the cylinder power than does the Fitchburg engine.

There is such a thing as over-doing efforts for getting "back loads" for cars which otherwise might return empty, and the Pacific railroads, apparently, have been guilty of this. As the grain, which is the chief production of the Pacific States, is marketed almost entirely by sea, the traffic movement from the Mississippi Valley to the Pacific has usually been much greater than in the other direction. To get loads for the cars which had been hauled eastward empty, the lines to Oregon and Washington made rates for shingles eastward very low—lower than the average cost of hauling freight on those railroads. All gained in that way seemed pretty much clear profit, available either for dividends, or for reducing westbound rates, or for both. But there are illimitable numbers of great cedar trees on the Pacific Coast, and they make very excellent shingles, at very little cost. The rail rates were so low and the eastern market so good that they stimulated the production of shingles until the eastbound shipments offered exceed the westbound; and every excess carload, taken at the existing rates, means loss to the railroads. When a car loaded with merchandise was hauled from Chicago to Seattle or Portland for, say, $100, and was hauled back empty, it was advantageous to offer to carry it full of shingles for $40; but when to get the shingles the car must be hauled west empty, it is not so amusing—at least, not to the carrier. In all such cases, and they are very numerous, but seldom on so great a scale—the aim should be to make the rate for return freight such as will equalize the traffic in the two directions, and carefully avoid reversing the current. It is a wise man, however, who can foresee the whole effect of reductions of rates.

Last December, in connection with discussion of the proposed Union Station at Washington, Mr. Loree was quoted as saying that the erection of fine stations, and the increasing expense connected with passenger business in general, was the dress parade part of railroad business; that it furnished no return proportionate to the outlay, but that it served to show what a great railroad was, and how great it was. Whether or not Mr. Loree is correctly quoted is quite unimportant. The picturesque remark is a good warning. Granting, on these grounds, that such dress parade is legitimate, the practice of beautifying localities of minor importance along the road by means of landscape gardening would seem to be not only justifiable but expedient, tending toward a broad and permanent kind of advertising. The American climate does not encourage lines of luxuriant green hedges along the right of way, as are frequent in England, but much can be done in the way of planting trees and shrubbery where they will be effective and in trimming up ragged places. A letter from the Philadelphia, Baltimore & Washington is printed in this issue, and the traveler will recall with pleasure the use of Crimson Rambler roses along that line. The effect of the dress parade of fine stations can certainly be heightened with the aid of the pipe-clay of landscape gardening.

TRADE CATALOGUES.

The Barker Mail Crane Co., Clinton, Iowa, issues a circular describing the Barker mail crane, which was illustrated in the *Railroad Gazette* March 6. The pamphlet sets forth the advantages of the crane, durability, simplicity, certainty of operation, ease on pouches, etc., and there is an illustration of the crane.

Cogs That Fit is a little pamphlet in which The Engineering Agency, Chicago, tells of how technical men often fail to progress and are dissatisfied because they are not in the right place. The business of this concern is to find technical men who can do things for the men who want things done. It has been established for 10 years and in that time has filled over 5,000 positions.

The J. A. Fay & Egan Co., Cincinnati, Ohio, manufacturers of woodworking machinery, have just published a pamphlet entitled "Instruction on the Erection and Care of Band Sawmills, Band Resaws and Band Saws, etc." The pamphlet is fully illustrated and gives an interesting and detailed description of the proper method for the erection and care of all band sawmills and their accessories.

Narrow Gage Railway Materials is the title of Arthur Koppel's catalogue No. 77. It has 80 pages, 8 in. x 10 in., and shows, full size, his 23 light rail sections from 8 lbs. to 45 lbs. per yard; his rolled-steel tie sections; portable and permanent switches, frogs, turn-tables, transfer cars, wheels and axles and more than 100 kinds of special cars for construction, factory, logging and other special work. It is unusually interesting and is valuable for reference.

The Chicago Pneumatic Tool Co. has issued "Special Circulars" 36 and 37 describing pneumatic hammers and pneumatic drills respectively. Circular 36 has a table giving the style of hammers, sizes and dimensions, work to which adapted, weight, etc.; also a comparison of the cost of hand and hammer riveting. The drill circular fully illustrates and describes the various drills made by the company, and also has a table similar to that given for the hammers.

Natural Woods, and how to finish them, is the title of a manual of 77 pages issued by Messrs. Berry Brothers, of Detroit. It is bound in muslin and gives specific directions for filling and polishing the cabinet woods in general use. It also describes the tints and methods of treating them. The introduction to one of them is significant: "Filipino—a new shade the general tone of which is very dark, and the marking of the grain a mossy green. This style of finish calls for no varnish."

The C. W. Hunt Co., New York, sends a pamphlet on their "Industrial and Railroad Ladle Cars." These cars have been specially designed for minimizing the danger of spilling molten metal. They are fitted with springs, steel wheels and flexible bearings for ease in taking switches. The height of the top of the ladle above the rails is only 36 in. for ladles of 1,500 lbs. capacity, and 38 in. for both 2,000 and 3,000 lbs. ladles. The gearing is arranged so that the hand wheel and ladle revolve in the same direction and is enclosed in an oil tight and dust proof iron case.

Data on Insulating Materials is a little pamphlet sent out by the Dielectric Manufacturing Co., St. Louis, Mo. It contains a number of diagrams having curves illustrating the dielectric strength of some of the commonly used insulating materials as determined in the laboratory of the company. In the diagrams the ordinates represent volts at breakdown, and the abscissæ thickness of the insulation in inches. There is also a curve showing the great decrease in the insulating qualities of transformer oil due to the presence of small amounts of water. The final diagram shows the permanent insulating qualities of "Dielectrol" when in continued contact with copper on the inside of the coils, the abscissæ in this case representing time in months between insulation of coil and test.

The Problem Solved is a pamphlet sent out by The Federal Supply Co., Chicago. The problem referred to is that of journal lubrication, and the solution is found in the use of steel wool journal packing. This packing is a mixture of 50 per cent. of the best long-fiber cotton waste and 50 per cent. of "steel wool." The combustion gives a springy substance carrying well the weight of the oil and standing up against the journal without tight packing. It is claimed that for a Central-Atlantic type locomotive and tender but 16 lbs. of this packing is required against 36 lbs. of ordinary waste. An eight-wheel passenger car requires 8 lbs., or about one-half of the amount of waste usually used. A special form of receptacle, made of expanded metal, holds the packing and reduces the space required to be filled. The pamphlet also describes the Toltz ash pan and the Robertson cinder pit conveyor sold by this company.

A Track Foreman's Qualifications.

[Mr. J. E. Conley had seven years of railroad service before going to college, and was for three years a supervisor on the Illinois Central. He is about to graduate from the University of Illinois, at Champaign, and the following is a part of his graduating thesis.]

A foreman should be a man of good moral character, pleasant to his assistants and laborers, honest and frank, and should combine with these great firmness. He should be a good judge of human nature, and should make this subject one of his principal studies. He should be punctual and demand the same on the part of his men. He should be of neat appearance and keep himself clean. He should not wear overalls or shirts that are tattered or torn, since a small additional expense on his own clothes will encourage his laborers to be cleaner and neater, and thereby present a better appearance and add to the pleasure and comfort of all parties. However, the other extreme, being too dressy, should not be indulged in, since it causes the laborers to lose their respect for the foreman.

A good foreman should be agreeable with other foremen with whom he comes in contact, for by so doing he may stimulate a spirit of comradeship which may be both beneficial and agreeable. By conversing with other foremen about their respective work he may add much to his own knowledge. In his intercourse with other foremen he should be courteous and make due allowance for different points of view.

The foreman should be a man of some intellectual ability, and should be a student; for he has charge of complicated switch and signal appliances and is required to maintain the track at a high standard, and unless he is a student he cannot keep up with the modifications and improvements introduced from time to time. Further he must be able to thoroughly understand the rules governing track work and also those relating to the movement of trains. He should fully understand all the signals employed in the train service. He should understand and be up to date on the time card. It is absolutely necessary that the foreman should have good hearing and good vision, and particularly he should be free from color blindness.

If in charge of a section of track he should personally inspect it each alternate day, and send a track walker over it each intermediate day. He should have a knowledge of the capacity of all water ways in his district; and should have such a knowledge of bridges and masonry as to be able to make a reliable report upon their strength and safety. The foreman should conscientiously patrol his district during heavy storms; and should at all times keep all material under his charge well cared for. All tools should be kept in first-class condition, and the proper kind and quantity of tools should be kept on hand to do the work required, and particularly he should see that the men take the tools with them required to do the work planned for the day.

The foreman should see that all tool houses are neat and clean. He should also see that boarding cars (if used) are kept scrupulously neat and clean and well ventilated, since carelessness in this respect is the cause of more sickness than all other elements combined. When men are boarded by the company, or private contractors, in boarding cars or camps, he should see that the men are given clean and wholesome food. When the company or individuals keep a commissary car, he should familiarize himself with the goods and prices, and demand justice for his men, and should his men object to trading at the car he should not try to coerce them to do so. He should have no interest in the commissary car nor allow himself to be unduly influenced by any man or company who runs the car. It takes considerable nerve for a foreman to make the above demands; but if he has proof that it is not being rightly run he should not be afraid of exposing any unjust methods, and his motives will always be upheld by his immediate superior.

Relation of Foreman to His Assistants.—If the fore-

man is allowed an assistant foreman, he should choose him, if possible, from among his own men; and not allow himself to favor relatives or others in preference to a worthy laborer, since by so doing he will encourage his men to greater efficiency with a hope of promotion, and will show them that he is actuated by a sense of justice.

He should maintain intimate relations with his assistant foremen, and should carefully explain to them his desires so that they may carry them out satisfactorily. The foreman should cultivate the art or knack of relieving his own responsibility by calling on his assistant foremen, which not only increases the efficiency of his assistants but also allows the foreman more time for more important duties. If the foreman holds his assistants responsible for results, he should as far as possible give them laborers who are satisfactory; and he should discuss with them all subjects pertaining to the discipline of the men. During the progress of the work the foreman should take note of any errors of the assistant foremen in matters of discipline, and should privately instruct them in better methods or reprimand them if the error was inexcusable. All reprimands should be as short and concise as possible, and still be as courteous as the circumstances will warrant.

Relation of the Foreman to the Laborers.—In hiring laborers a foreman cannot always be as particular as he would like, as it is sometimes necessary to take any kind of men he can get, particularly as the wages are low and the work hard and monotonous. In making up a gang of men it is always expected that some will be agitators, some incompetent, and some lazy. The best judgment possible is needed to organize men of this class into an efficient gang. The foreman can add greatly to the efficiency of the gang by properly placing the different laborers. For example, if a lazy man is placed between two active workers, he must keep up or become conspicuous for his failure to do so. Again a man should be set to do the class of work at which he is most expert. In all this the foreman should seek to treat the men fairly, and if there is a particularly disagreeable job he should see that all take turns at it. Above all, a foreman should have no pets nor show any favors to any one, except, of course, to favor a man temporarily injured or one who has grown old in the service.

The foreman should pair his men off so that each man and his partner are congenial, since the men are then more likely to be contented and efficient. In placing the men it is not wise to allow too many of one family or of one nationality in the same squad. Attention to the above matters will prevent or greatly reduce the tendency to strike. The most exacting and unreasonable laborers respond quickly, or at least ultimately, to wise and judicious management.

The foreman should be quick to take in new situations, quick to plan ways where difficult tasks are at hand. When planning work for his men, he should plan methods of carrying it out by the use of mechanical devices that can be made on the ground or be obtained quickly.

The foreman should know his men by name, and on meeting them in the morning should have a "Good Morning" for all, and should recognize the good qualities of each without condescending or patronizing them too much. In this way he presents an example to them to be courteous to each other. He should make it evident that he desired this on their part, by mild reproof if necessary. In addressing his men he should call them by their given name or surname, but should never use nicknames or permit his assistants to do so. Owing to this example, he or his assistants will rarely, if ever, be called by any nicknames; and if through ignorance a laborer does address his foreman in an improper manner he should be corrected kindly but firmly. The foreman should show his men by his manner that he has confidence in them, and should avoid showing any suspicions until they can easily be proven. In a reserved but appreciative manner he should notice all good qualities in the laborers. He should develop in them confidence and security of their retention. "The foreman has always stood by me and I will stand by him" is a good strike preventive. With tact and good judgment he can develop a gang of loyal men who will obey and respect him.

A foreman before reprimanding a man should be careful and know that he is right and that the man is in the wrong. However, should he make an error of this kind he should acknowledge his mistake to his men and not try to carry a high head and say nothing about it, just because he has a little authority. He should never curse or swear at his men, since kind words will accomplish more. He should be careful in condemning or reprimanding a laborer for failure to work on Sunday on account of his religious scruples. It would be better to overlook it altogether. However, when it is very necessary that he work his forces on Sundays, as in case of a wreck or wash-out, he should have such control of his men that they will respond to his call. The foreman should discharge the agitator who tries to talk a gang of men into refusing to work on such occasions, when he reported for work on the following day; and he should also give the rest to understand that their services were not wanted unless they were willing to work in emergencies of this kind. If the foreman thinks it possible to hire a new gang in the vicinity in a short time, he should insist that all who refuse to work in an emergency should hunt work elsewhere. Tact and good judgment are required in cases of this kind in order to keep a full gang and at the same time uphold his name in the vicinity and his authority with his men.

The foreman should recognize his men whenever he meets them outside of working hours and should be cordial but avoid familiarity. Above all, he should avoid drinking liquors with them, as nothing is more surely to breed contempt and causes the laborer to lose his respect for the foreman.

The chances are that in the future it will be necessary to employ negroes, Italians, or Greeks, for all gangs of any size, as it is hardly possible to get enough Americans for section forces at the present time. To handle the above classes of men the best foreman on a division is chosen. To successfully manage a large gang of negroes, the foreman should be a strong man, firm in his demands, and a hustler; for if he cannot get the negroes out of their sing-song southern ways into quick methods of doing the work, it is not likely that he will be successful. If a gang of colored men find out that a foreman is timid and slow, it is almost certain that they will try to bluff him, and be slow in executing the work and become very talkative among themselves. If they even start the latter evil, it is very likely that the foreman will have all he can do to manage them. He can break this up easiest by arranging his work so that they will be more or less on the move. For example, if he had a large gang of men spiking new track, instead of giving each spiking gang a large section of track to spike up he should space small squads one or two rail lengths apart and have, say, each gang spike each fifth rail or each fifth pair of rails, etc. This class of men have a tendency occasionally to lay off a day, and many will not report in the morning until after the work commences. To stop this it is necessary to discharge offenders of either kind. While it is true that when they work steady they stay only a short time in a place, it is better to make them work steady or leave; because if a few lie around the camp or boarding cars, they entice others to stay with them; and it often happens that when the evil is not checked promptly more of them are laying off than are working. When working colored men the foreman should make arrangements to have his gang replenished from time to time as necessary. He should not allow them to carry concealed weapons of any kind. Discharge a man as soon as it is learned that he carries weapons. By careful culling, a foreman can often pick a gang that will work steady and well, if properly managed.

The handling of Greeks and Italians is harder than that of negroes. The former are generally steady workers; but on track work or in laying steel they will not accomplish as much by 20 per cent. as an equal number of colored men. It is almost impossible to discharge a Greek or an Italian without losing the whole gang, as they will stick together; and often 100 will leave owing to the discharge of only one of their number. If a foreman desires to get rid of only a few of this class of laborers, he must do it by some indirect means. The following is one method that has been employed. The railroad company usually furnishes boarding cars for the men and generally there is plenty of accommodation for the gang. The foreman can assign a few of the least desirable men to a particular car and send that car to some distant point, preferably toward the rendezvous of that class of labor (usually a large city), which place it will be easier for them to reach than to return to the original gang. Then if the new foreman discharges one of them and they all leave, the desired result is accomplished with a loss of only a few men. In making this move the first foreman should arrange with the transportation department to have some through night train pick up the desired car, so that they will be properly treated while in transit.

The foreman should not allow any interpreter on the work, even if it does retard the work a little at first. An interpreter is generally an agitator, and can cause a foreman unlimited trouble. With good assistants, a foreman can handle this class of labor with better satisfaction than if he employs interpreters. The foreman will find that it is necessary to keep this class of men at the same kind of work, and also to so arrange the work that one squad must keep out of the way of the next. When the squads are thus arranged the foreman should instruct the first squad as to the best and easiest way of doing the work, and encourage them until they have attained a reasonable speed, after which he should take each succeeding squad in hand in a similar way. The foreman should endeavor to have all parts of the work proceed smoothly and at a satisfactory rate. If laborers of this class are kept for some time at exactly the same kind of work and are properly instructed, they will accomplish more in surfacing track and ballasting than an equal number of colored men organized in the same way.

There is another class of labor to manage which requires great skill and watchfulness on the part of the foreman. In any considerable gang of railroad workers there is likely to be a number having a restless, roving disposition. They come from nearly all classes of people, and in many cases have had no restraining influences at home, and oftentimes have no home at all. They have no fear of being discharged, and work only long enough to earn what is necessary for their mere existence. With this kind of men rules or exacting methods are practically useless, and a foreman will be continually changing the men owing to their careless and wandering ways. Good judgment on the part of the foreman in hiring men will greatly lessen his troubles with this class and also materially increase the amount of work accomplished by the gang.

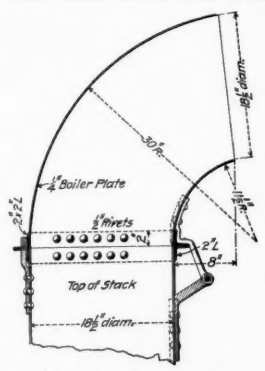
Finally a foreman in his treatment of the laborers should be strictly honest toward his own employers. He should not allow pay to a man (no matter how good) for any time that he did not work, because if the foreman should reward a man this way once, he will likely ask greater favors in the future. If a foreman thinks a man worthy of better wages, he should ask his superior to promote the man or raise his wages. The foreman should avoid holding wages or assisting merchants to collect money from men working for him. Let the merchant handle this matter himself. However, should a merchant speak to the foreman about matters of this kind he should be advised to speak to the laborer and tell him what he intends to do about the matter. Many such cases can be settled in this way.

If the foreman should receive orders to reduce his forces, he should have consideration for good men, particularly if it is not likely that they can get work elsewhere. For example, if a section foreman who is employing six men receives an order to reduce his force to four men, he should divide the work between the six rather than discharge two. But in this distribution he should regard the relative needs of the several men. A section foreman should be liberal to his men in giving them discarded material, such as old ties, pile heads, and old planks. If the company permits gardening on the right of way, the foreman should encourage his men to cultivate part of it; but a foreman should not allow pay to a laborer for time he works in his garden.

There is no theory of the control and management of men that is perfect, and there will always be opportunity to exercise tact and good judgment.

Smoke-Stack Hoods in the Cascade Tunnel.

The Cascade Tunnel, on the line of the Great Northern, is approximately two and a half miles long, on a grade of one and seven-tenths per cent. against eastbound traffic. Owing to the entire impracticability of driving air shafts through the mountain overhead, the collection of heat and gases in the tunnel has been a serious danger to be contended against, and there are several cases on record where train crews have been wholly or partially overcome. The steep grade tends to keep the heated air moving towards the upper end, as there is no summit within the tunnel, but, on the other hand, it is necessary for a locomotive to be worked to its full capacity when a heavy freight train is being hauled up the grade, so that a large amount of steam and gas is constantly emitted in the tunnel.



Smoke-Stack Hood.

The method now employed for working trains in safety depends primarily upon the use of engine crews thoroughly familiar with the locality. Westbound engines drift through the tunnel with steam shut off. Eastbound traffic is taken through with pushers, and the locomotive at the head of the train does not make use of its own steam. Passenger trains go through in one section; freights, in two. The tunnel is worked as a single block, and in case of delay in the tunnel, the engineer has instructions to back his train out. It has been found that it is the heat, rather than gas, which makes trouble, as the increase in temperature is about 50 degrees during the eight minutes an eastbound passenger train is in the tunnel, and the 20 minutes to half an hour required for a freight.

The pusher engine is fitted with a smoke-stack hood, shown in the illustration. The hood is connected to the stack by a hinged joint at the back, and there is also a pin with a cotter riveted to the stack at the front, which passes through a hole in the flange of the hood, so that when the hood is in position, as shown in the print, it is held firmly in place. The hood is thrown in this position when the engine enters the tunnel, and turned back of the stack after leaving. The advantage gained is that the smoke from the locomotive is directed backward along the tunnel, instead of being driven forcibly against the roof and spread out so as to envelop the cab and train. The device has proved very helpful.

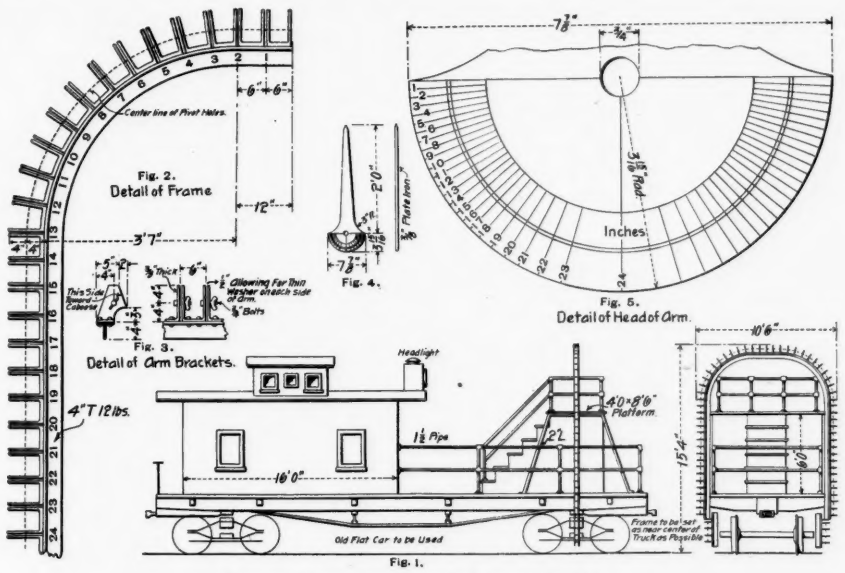
Baltimore & Ohio Tunnel Measuring Car.

The car shown in side and end elevation in Fig. 1 consists of a measuring apparatus, mounted upon a flat car, at one end of which is a caboose provided with bunks, a table, chairs, lamps, stove, buckets, etc. The cabin is 16 ft. long, and is built with a monitor lookout. The hood next to the open portion of the car carries a headlight.

Immediately over the front truck a frame made of 4-in. T steel is placed. The frame extends 14 ft. 8 in. above the rails and is 9 ft. 2 in. wide. It is flat across the top for a distance of 2 ft., and then comes down to the sides on a quarter circle having a radius of 3 ft. 7 in. This frame drops down alongside the car to a point about 18 in. below the floor. Suspended to the lower end of this frame is another reaching to within a little less than a foot of the rails, but set in 7 in. nearer the center upon each side, as shown in the end elevation of Fig. 1. The detail of the frame itself is shown in Fig. 2. Brackets are riveted to the flange of the T at inter-

vals of 6 in. over the top and sides. These brackets are shown in detail in Fig. 3, 69 sets being required for the outfit. They are merely two wrought-iron plates of the form and dimensions shown, provided with a thumb-screw by means of which the arm (Fig. 4) may be clamped in any desired position. These arms are 24 in. long from the point to the pivot and have a graduated half circle at the base, shown on an enlarged scale in Fig. 5.

Access to the frame and all of the clamping brackets is obtained from a platform carried by 2 in. angles, and approached by the flight of steps. The whole of the open portion of the car as well as the elevated platform is



Tunnel Measuring Car—Baltimore & Ohio.

protected by 1½ in. pipe railings. The scaling of the half circle at the base of the pointer shown in Fig. 5 runs from 1 to 24, and indicates the distance that the end of the arm projects beyond the center of the pivot, when the line of the corresponding number coincides with the edge of the bracket where it joins the frame. As the center of each of these holes is accurately located and numbered, the corresponding point upon a tunnel or bridge is at once indicated when the end of the arm is brought into contact with it.

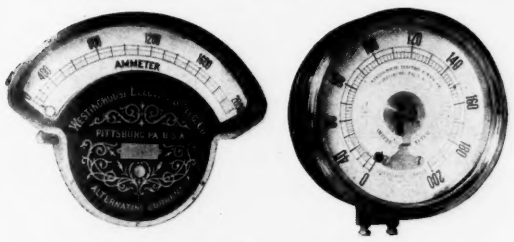
As the scaling reads both ways from the center, it is possible to move the car through a bridge or tunnel in either direction and set the arms so that they will trail. In this position they are not apt to be broken or injured by striking against any projection, since they are held in place by friction only and will readily turn on the pivot under the influence of a blow. In this way the pointers can be set to any desired position for the inspection of new work or the measurement of old, and the car run at any convenient speed without danger to the operators or a likelihood of its receiving any damage. At the same time any obstruction that comes within reach of the arms can be quickly and easily measured and located.

The car was built from the designs of Mr. J. M. Graham, Chief Engineer.

Alternating Current Long Scale Voltmeter and Ammeter.

The accompanying cuts are illustrations of an improved form of voltmeter and ammeter, possessing a grade of excellence which has not been secured heretofore in alternating-current switchboard practice. These are induction instruments, and in principle of operation are closely allied to the integrating wattmeter made by the same company, the Westinghouse Electric & Mfg. Co. These instruments, simple in design, are made in the pattern shown herewith, and also in the more familiar circular form.

The scales begin at zero, and the divisions are absolutely proportioned and uniform above 20 per cent. of the full capacity, with a length and openness allowing the readings to be made with accuracy. As an additional aid to easy and correct reading from a distance the dial is made of translucent material, lighted from the rear, while the markings are distinct and the figures large and prominent. The lamps for illuminating this scale are enclosed in a compartment separate from the rest of the mechanism, giving perfect ventilation and not heating the working parts.



Alternating Current Ammeter.

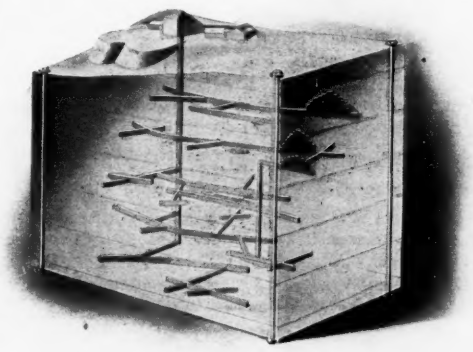
In this type an electro-magnet produces a shifting magnetic field, in the air gap of which is an aluminum disc in which currents are induced by the field, resulting in the disc's movement. This motion being opposed by a spring, the amount of deflection is shown by a pointer mounted on the shaft of the disc. When the pointer is at the zero position, the outline of the disc being spiral, the air gap closes that portion of the disc having the longest radius. As the deflections increase the enclosed radii decrease, diminishing the pull on the disc until it becomes proportional directly to the current, resulting in a uniform scale.

These instruments are unaffected by external fields, are totally dead-beat, and are compensated for changes in temperature and frequency. The moving elements being light in weight, the bearings perfect, finely ground jewels and the shaft carefully hardened and polished, friction becomes a negligible quantity. The parts are interchangeable, and the cases dust-proof and of neat appearance.

Instead of requiring the main current to be brought to the instrument, necessitating in some cases expensive bus-bar connections, this make of ammeter is arranged to operate from five ampere secondaries of series transformers, thus enabling the instrument to be mounted at any convenient point.

Glass Models of Underground Workings.

The Hill-Chamberlain Mfg. Co., 498 Broome street, New York, makes models out of thick sheets of clear white glass laid one upon another and bolted together so as to form a solid mass. The underground workings are excavated from the glass and all drifts, shafts, stopes, winzes, up-raises, etc., are shown as miniature excavations just as they exist in a mine. The top of the model,



Glass Model Showing Underground Workings.

representing the surface of the ground above the mine, is cut so as to exactly represent the topography of the surface. The sides and surface of the model are highly polished and allow a clear view of the interior or underground workings of the mine from any direction. The models are very attractive in appearance. It is also possible to show veins and ore bodies in place, as well as dykes, fissures, etc.

TECHNICAL.

Manufacturing and Business.

The Rand Drill Co. is making plans for an extensive addition to its shops.

The new address of the Spiral Nut Lock Co. is Central Building, 143 Liberty street, New York.

C. H. Wilmerding, Consulting Engineer, Chicago, has moved his office from The Temple to 1100 Old Colony Building.

At a recent meeting of the Salford (England) Borough Council a contract for 50 tram cars at approximately $3,700 each was given to the Westinghouse Company.

The American Blower Co., Detroit, Mich., has recently opened an office at 615 Hale Bldg., Philadelphia, in charge of Benj. Adams, and one at 318 Frick Bldg., Pittsburg, in charge of H. P. Curtiss.

Pawling & Harnischfeger, makers of cranes and hoists, Milwaukee, Wis., have leased the shops lately used by the Nordberg Mfg. Co., and fitted them with machinery to take the place of the building recently destroyed by fire.

Announcement is made of the dissolution of partnership of the firm of G. S. Wood & Co., Chicago, composed of Harry H. Schroyer, G. S. Wood and Stanley Woodworth. The firm is succeeded by the Acme Supply Co., the members of which are the same as those which composed the old firm.

The A. H. Andrews Co., Chicago, has moved its general offices and salesrooms from 300 Wabash avenue to 174 and 176 Wabash avenue. A fine new factory, said to be the largest of its kind in the world, has recently been put in use. This company makes furniture for offices, banks, schools, etc., and all kinds of settees for public halls, parks and waiting rooms.

The S. Obermayer Co., making foundry facings, supplies and equipments, is adding new machinery and buildings to its Chicago plant, which will increase the present capacity about 40 per cent. During the past year the capacity of the Cincinnati and Pittsburg plants has been doubled, and the three plants, equipped with modern machinery, are now running 20 hours a day.

Northern Engineering Works, crane builders, Detroit, Mich., report recent sales of electric traveling cranes to Lambert Hoisting Engine Co., second order; Fort Pitt Bridge Works, fourth order; Sessions Foundry Co.; Waterbury Machine Co.; Union Carbide Co.; Webster, Camp & Lane Co.; and hand cranes to Clarage Foundry Co.; Winton Motor Co.; Northern Electrical Works; Elk Tanning Co.; Windsor Mills, and Pawtucket Foundry Co.

The Continuous Rail Joint Company of America has bought 20 acres of land at Troy, N. Y., with the rolling mills and shops formerly owned by the Troy Steel Company. This plant will hereafter be known as the Albany Iron & Steel Works Department of the Continuous Rail Joint Company of America, and the company expects to greatly increase its business. The continuous rail joints are in use on 15,000 miles of track. The general offices of the company remain in Newark, N. J.

The United States Circuit Court of Appeals for the Seventh Circuit has affirmed the decision of the lower court in the Northern District of Illinois granting to William C. Baker an injunction against infringers of his patent on his combination cock, with filling funnel, for the Baker car heater. The Circuit Court of Appeals is the court of last resort in cases of this kind. In the decision it is held that the screw threaded connection in Mr. Baker's design is not the mere equivalent of a union nut, but that the shoulder, with its automatic connection, making a sufficiently tight joint, is a different combination. "The claim is therefore valid and the infringement is undoubted."

A. M. Baird has been appointed to represent the Falls Hollow Staybolt Co., with office at 933 Jackson street, Topeka, Kan. Mr. Baird was formerly boiler maker at the shops of the Atchison, Topeka & Santa Fe, at Topeka, and has been in the employ of other western railroads as foreman boiler maker. He has invented a number of compressed air tools, among them the Baird staybolt nipper. The company informs us that Falls hollow staybolt iron has been specified on a number of recent large orders for new locomotives, and the same kind of material will be used on the new U. S. Government lighthouse tenders "Magnolia" and "Ivy," contracts for which were recently placed with the Baltimore Shipbuilding & Dry Dock Co. The company is making also, from double refined charcoal material, solid staybolt iron.

Iron and Steel.

The Fairmount Steel Co., of Fairmount, W. Va., has been incorporated with $100,000 capital.

The Seaboard Steel & Iron Co. is reported to have been incorporated at Washington, D. C., with a capital of $5,000,000.

The Omega Steel Co., Portland, Me., has been incorporated with $3,000,000 capital, to operate blast furnaces, coke ovens, etc. President, A. C. Conant; Treasurer, J. H. Strange.

The Pacific Iron & Steel Co. has been incorporated with $1,000,000 capital, by D. M. Barringer, J. C. Jones and J. S. Adams, 419 Market street, Camden, N. J., to make bridges and structural work.

A duty of $7 a ton has been established on rails imported into Canada, to take effect as soon as the Government is satisfied that Canadian mills are making enough rails of the best quality to supply the home market.

The Eastern Steel Foundry Co. has been incorporated under the laws of New Jersey, with $1,800,000 capital, to make iron and steel in all forms. The incorporators are John T. Dutcher, A. Judson Stone and John A. O'Connor, New York city; Wm. H. Carrich and Wm. H. Corbin, Jersey City.

Electro-Pneumatic Air Storage Tests.

Bion J. Arnold is testing at Lansing, Mich., the electro-pneumatic system of air storage of electric power

described by him in a paper read before the American Institute of Electrical Engineers last June, and printed in the *Railroad Gazette* June 27, 1902.

Osmium Electric Lamps.

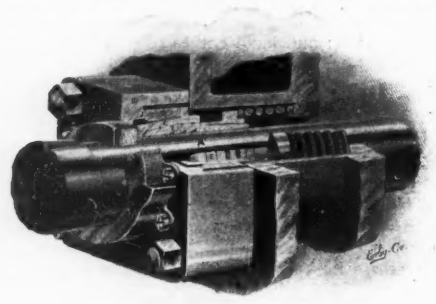
A German railroad which has used electric lights with accumulator batteries since 1894, since August last has substituted osmium lamps for the carbon lamps generally used; and now reports a very great improvement in the results, though the osmium lamps are very much more costly. They burn about 1,000 hours, or three times as long as the carbon lamps, and consume less than half as much electricity for the same amount of light.

Hall Electro-Gas Signals on Baltimore & Ohio.

The following statement comes to the *Railroad Gazette* from the General Manager of the Baltimore & Ohio: "During the past year the Baltimore & Ohio Railroad has fully equipped the Philadelphia division with the Hall automatic electric signals. After the work was completed the Hall Signal Company perfected the electro-gas automatic signal, that proved to be the best device yet put on the market, and this railroad company has ordered the new device for each of the Philadelphia division signals."

Metallic Packing for Enlarged End Piston Rods.

The illustration shows the adaptation of the Jerome metallic packing to piston rods having enlarged crosshead fit. A new design of cone and follower is used in connection with the standard form of packing ring. Both cone and follower are made in two parts, with dowel pins, and each is held by a retaining ring, made large enough to slip over the enlarged end of the rod. A stop is provided on



the outside cone against which the retaining ring bears, preventing it from being forced on to the cone sufficiently hard to burst it. The joint between the gland and retaining ring is ground. A new style of swab-holder is shown on the front of the gland. It is made in halves and has three openings for oiling—one on each side and one at the top. Jerome & Elliott, Chicago, makers of this packing, have had it in service for more than a year now. A large number of sets are giving satisfactory service.

THE SCRAP HEAP.

Notes.

The New Mexico Legislature has passed a law appropriating funds for a highway across the mountains of the Pecos forest reserve, from Santa Fe to Las Vegas, a distance of 40 miles.

Press despatches of April 27 report a rear collision on the Missouri Pacific near Buffalo, Kan., in which 11 workmen were killed and 25 injured. The train which was run into was a work train.

The Duluth, Missabe & Northern is to put up a building 34 ft. x 60 ft. for the Young Men's Christian Association at Proctorknott, Minn. A similar building has recently been finished at Two Harbors.

John M. Wisker, engineman of the New York Central train which ran into the rear of a preceding New Haven train in New York city Jan. 8, 1902, killing 17 passengers, was tried on a charge of manslaughter in the second degree in the Supreme Court of New York last week and was acquitted. In the charge to the Jury, by Justice Scott, the facts were set forth accurately, in accordance with statements of the case which are familiar to the readers of the *Railroad Gazette;* and the Judge particularly charged that if Wisker did not see the distant signal he should at once have taken measures to find out what was the matter. On his first appearance in court for this trial Wisker appeared to have recovered from the weak and distressed mental condition that he was in at the time of the collision and afterward; but at the end of the three days' trial he was again in a similar pitiable condition. The Jury evidently was actuated largely by sympathy.

Frogs to be Blocked in Illinois.

At the April meeting of the Railroad and Warehouse Commission of Illinois it was ordered that all frogs and guard rails and the heels of all switch points in all switches in the State be protected by foot guards or blocking. July 1 is the time set as the limit for compliance with the order.

A 24-Mile Tangent.

The cut-off now building by the Chicago Great Western between Waverly and Oelwein, Iowa, is 30 miles long, and for 24 miles of this distance the line is tangent. The ruling grade is 26 ft. to the mile, against eastbound traffic, and approximately 36 ft. against westbound traffic. On May 1 grading and bridge work will be about a third completed. The work involves one bridge 600 ft. long, across Red Cedar River, at Waverly, but no others of consequence.

Railroad Accidents, Last Quarter of 1902.

The Interstate Commerce Commission has issued Accident Bulletin No. 6, for the three months ending Dec. 31, 1902. During that period in train accidents there were 266 persons killed and 2,788 injured. Accidents of other kinds bring the total number of casualties up to 938 killed and 11,873 injured. Forty passengers were killed and 1,097 injured in collisions, derailments and other train accidents. Sixty-three employees were killed and 713 injured in coupling and uncoupling cars, 36 per cent. of these occurring while using uncoupling mechanism. The total number of collisions was 1,688 and of derailments 1,079. The damage to cars, engines and roadway by these accidents amounted to $2,462,056.

Swedish Railroads in 1900.

The following statistics of Swedish railroads, both government and private, for the year 1900, are taken from the *Archiv für Eisenbahnwesen.* The foreign units have been changed to American standards:

	Government railroads.	Private railroads.
Miles worked	2,370	4,190
Train miles, total	22.2 millions	
Rev. from pass. service, per mile of road.	$1,868	$825
Passenger miles, total	504 millions	
Average passenger mile revenue (cts.)	1.39	1.64
Average passenger journey, miles	26.1	11.2
Revenue per mile of road, freight service	$3,250	$1,812
Ton-miles, total	944 millions	
Investment, per mile	$40,200	$21,700
Percent. of net earnings to investment	3.06	4.67
Ton-mile revenue (cts.)	1.47	1.84
Average freight haul (miles)	73.3	27.7

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page xvi.)

Western Society of Engineers.

At a meeting of the Society in Chicago on April 29, a paper on "The Borings for the Bohio Dam, for the Panama Canal," was presented by R. C. Smith, member of the Society.

Railway Signaling Club.

The next meeting of this club will be held at the Great Northern Hotel, Chicago, on Tuesday, May 12, at 2 p.m. The President requests members to come prepared to discuss Question No. 8, left over from the March meeting—"In the preparation of time-tables, what consideration is given to the block signal capacity of the line?"

PERSONAL.

—Mr. John B. Wright, for several years a Division Superintendent of the Southern Pacific Company, died at his home in Sacramento, April 26. Mr. Wright was born in 1852 in Brooklyn, N. Y., and began his railroad service in 1871.

—Mr. N. P. Lovering, for a number of years General Passenger Agent of the Passumpsic Railroad and Division Passenger Agent of the Boston & Maine, after the Passumpsic was absorbed by the Boston & Maine, died April 23, aged 71 years.

—Mr. B. H. Hitchcock, a well-known civil engineer, died at Toledo, April 23, at the age of 74. Mr. Hitchcock made one of the earliest surveys of the Hoosac Tunnel. In 1852 he was engaged in the survey for the Wabash Railroad. One of his sons is Mr. E. B. Hitchcock, of the Chicago & North Western.

—Mr. C. Lydon, for many years Division Superintendent on the Denver & Rio Grande, died recently at the age of 57 years. Mr. Lydon's railroad service dates from 1862, when he began as a brakeman on the Lake Shore & Michigan Southern. He was a conductor on the Canadian Pacific, and went from there to the Denver & Rio Grande in a similar capacity.

—Mr. Perley N. Place, the new Superintendent of the Saginaw District of the Pere Marquette, succeeding Mr. Trump, was born at Farmington, Mich., in 1870. Mr. Place's railroad service began in 1885 as a messenger for the Flint & Pere Marquette. He subsequently became telegraph operator, purser on a steamboat, time keeper and chief clerk to the General Superintendent. In 1900 he was made Trainmaster of the Pere Marquette, successor to the Flint & Pere Marquette, and for one year (1902-1903) he was General Trainmaster.

—Messrs. J. T. Tatlow, Locomotive Department Manager; G. Banks, Freight Traffic Superintendent; John Wharton, Freight Traffic Manager, and F. Dale, Chief Accountant, officials of the Lancashire & Yorkshire Railway, arrived in New York city April 24, to study the railroad situation in the United States and especially to look into the methods of administration in the various departments in which they are interested. About a year ago Mr. C. W. Bayley, Chief Traffic Manager, made a similar tour of inspection through the United States.

—Mr. Charles A. McAlpine, Superintendent of the Providence Division of the New York, New Haven & Hartford, died at his home, in Hyde Park, Mass., April 27. He was a native of Concord, N. H., and began railroading in 1870, at the age of 22, on the Boston, Clinton & Fitchburg, which became the Northern Division of the Old Colony, now the N. Y., N. H. & H. He was first a brakeman, then a conductor, and then for many years was station agent at Mansfield. In 1891 he was made Superintendent of the Northern Division, and three years later was transferred to the Providence Division.

—Mr. Clifford S. Sims, who has succeeded Mr. Potter as General Manager of the Baltimore & Ohio, will take his new position on Friday, May 1. A portrait of Mr. Sims was published at the time of his appointment to the position he now leaves, that of General Superintendent at New York city, and appeared in the *Railroad Gazette*, April 11, 1902, page 276. He was born in Arkansas in 1868 and began his railroad service as a chainman on the Pennsylvania in 1885. He worked in the engineering department for about 16 years, and in 1901 was made Superintendent of the Chicago Terminal Division of the Pennsylvania.

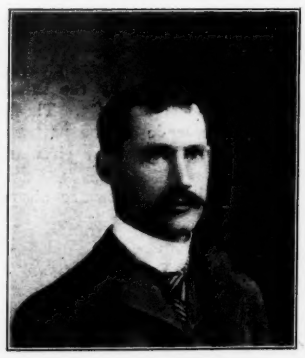
—Colonel William Bailey, a well-known railroad promoter, 66 years old, died suddenly at his home in New York city, April 24. Col. Bailey took a degree at the Harvard Law School, was a student, and afterwards an instructor, in the Pope Medical School in St. Louis. For many years he was engaged in promoting western railroads, and in 1869 he was President and General Manager of the Commerce Little Rock & Texas. Since that time he has been connected with various roads in different capacities. Col. Bailey commanded the 10th Missouri Volunteers in the Civil War, and was later an assistant paymaster in the army.

—Mr. William D. Trump, whose promotion from the Superintendency of the Saginaw District to the Assistant General Superintendency of the Pere Marquette was announced recently, is 39 years old. Shortly after graduating from High School Mr. Trump began his railroad service as a telegraph operator for the Flint & Pere Marquette, now the Pere Marquette. From 1886 to 1895 he was chief clerk; and in the latter year was appointed Assistant to the General Manager. In 1897 he was promoted to be General Superintendent of the F. & P. M., and in January, 1900, was made Superintendent of the enlarged Pere Marquette, which position he has held until now.

—Mr. T. W. Geer, Manager of the Tifton, Thomasville & Gulf, was born in 1867. He began railroading in the telegraph department of the Chesapeake & Ohio in 1881. In 1884 he went to the Pennsylvania Company; and in 1888 to the Northern Pacific, where he held various positions. From 1895 to 1897 Mr. Geer was Superintendent and General Manager of the Litchfield, Carrollton & Western, and from 1897 to 1900 was Superintendent of the Hutchinson & Southern, now a part of the Atchison, Topeka & Santa Fe. For one year (1902-1903) he was Superintendent of the Mobile, Jackson & Kansas City, which position he resigned to go to the Tifton, Thomasville & Gulf.

—Mr. Anthony J. Thomas, a prominent railroad man, died suddenly in New York city April 24. Mr. Thomas was born in 1826 at Baltimore, Md. When quite young he went into business for himself, but later became managing clerk for the banking firm of Drexel, Morgan & Company. Mr. Thomas's railroad experience dates from 1874, when he became Treasurer of the Cairo & Vincennes Railroad. Since that time he has been connected with the management or re-organization of a number of companies. He was Second Vice-President of the Northern Pacific, and was also at times Receiver of the Havana Division of the Wabash, St. Louis & Pacific; Receiver of the Cairo, Vincennes & Chicago, and Vice-President of the Pittsburgh & Western.

—The new General Superintendent of the Chicago, Rock Island & Pacific's Western District, Mr. James M. Gruber, was for a number of years Assistant General Superintendent of the Eastern District of the Great Northern. Mr. Gruber was born at Iowa City, Iowa, in 1868, and entered railroad service at the age of 17 years as a stenographer and clerk in the general freight office of the St. Paul, Minneapolis & Manitoba. From 1886 to 1889 he held a similar position in the General Manager's office. In 1889 he resigned to go to the Atchison, Topeka & Santa Fe, but soon went to the Montana Central as General Superintendent. In March, 1897, he was made Assistant General Superintendent of the Great Northern's Eastern District, which position he now resigns to go to the Rock Island.



—Mr. E. A. Hornbeck, who has succeeded the late Mr. Waterman as General Manager of the San Diego, Cuyamaca & Eastern Railway, was born at Ellenville, N. Y., in 1855. At the age of 15 years he became operator and agent for the St. Joseph & Grand Island. Then for four years he was with the Atchison, Topeka & Santa Fe as operator and relief agent. In 1884 and 1885 he was in the construction department on the Atlantic & Pacific, opening the first telegraph office at Flagstaff, Ariz., which was then the terminus of this company. In the latter

year he was transferred to California to become Treasurer of the National City & Otay Railway. Since 1892 Mr. Hornbeck has been Superintendent and Assistant Treasurer, which position he will continue to hold in addition to the management of the San Diego, Cuyamaca & Eastern.

—Mr. William A. Garrett, who, on May 1, succeeds Mr. Murphy (now Vice-President) as General Manager of the Cincinnati, New Orleans & Texas Pacific Railway and of the Alabama Great Southern, was born at Canton, Miss., in 1861. He began his railroad career in 1876 as a messenger for the Ohio & Mississippi. From there he went to St. Louis (the Terminal Railroad Association) and was subsequently Terminal Superintendent of the Wabash at St. Louis. In 1896 he became Superintendent of the Western Division of that road, but in 1899 he resigned to go to the Philadelphia & Reading, and the following year was made Superintendent of the New York Division. Upon Mr. Besler's resignation to go to the Central of New Jersey, Mr. Garrett was made General Superintendent of the Reading, which position he has just resigned.

ELECTIONS AND APPOINTMENTS.

Alabama Great Southern.—See Cincinnati, New Orleans & Texas Pacific.

Baltimore & Ohio.—Hugh L. Bond, heretofore General Attorney, has been appointed Second Vice-President, in charge of the legal department. George L. Potter has been appointed Third Vice-President in charge of the operating department. C. S. Sims, heretofore General Superintendent at New York city, succeeds Mr. Potter as General Manager. All of these take effect May 1, and the offices of all are at Baltimore.

Chicago, Milwaukee & St. Paul.—J. N. Barr has been appointed Vice-President, to have charge of motive power and rolling stock. D. L. Bush, heretofore Assistant General Superintendent at Milwaukee, Wis., has been appointed to succeed Mr. Barr as General Superintendent, with headquarters at Chicago, Ill., and Mr. Bush in turn is succeeded by H. B. Earling, heretofore Division Superintendent at Marion, Iowa, effective May 1.

Cincinnati, New Orleans & Texas Pacific.—W. J. Murphy has been elected Vice-President, and W. A. Garrett, heretofore General Superintendent of the Philadelphia & Reading, has been appointed General Manager of the C., N. O. & T. P., and of the Alabama Great Southern, with headquarters at Cincinnati, Ohio, succeeding Mr. Murphy.

Des Moines, Iowa Falls & Northern.—A. R. Breckenridge, Master Mechanic, with headquarters at Iowa Falls, Iowa, has resigned to take a position with the Great Northern.

Erie.—J. W. Fawcett, Division Engineer, with headquarters at Youngstown, Ohio, has resigned. (See Great Northern.)

Georgia, Florida & Alabama.—W. M. Legg has been appointed General Manager, with headquarters at Bainbridge, Ga. R. B. Coleman has been appointed General Freight and Passenger Agent, succeeding E. K. Bryan, Jr., resigned. The position of General Superintendent, formerly held by Mr. Coleman, has been abolished.

J. J. Anderson, heretofore Master Mechanic of the Tifton, Thomasville & Gulf, has been appointed Master Mechanic of the G., F. & A., with headquarters at Bainbridge, Ga.

Great Northern.—George T. Slade, heretofore General Superintendent of the Erie, has been appointed General Superintendent of the G. N., with headquarters at St. Paul, Minn.

See Des Moines, Iowa Falls & Northern.

Houston & Texas Central.—R. S. Lovett has been elected President.

Illinois Central.—O. J. Travis, Superintendent of Bridges, with office at Chicago, Ill., has resigned.

Mexican Central.—J. F. Casey has been appointed Superintendent, with headquarters at Tulancingo, Mex., succeeding R. Honey, Jr.

Mobile, Jackson & Kansas City.—R. H. Cobbs, Jr., has been appointed General Superintendent, with headquarters at Mobile, Ala.

New York Central & Hudson River.—W. H. Knowlton, heretofore Assistant Chief Engineer of the Chicago Great Western, has been appointed Principal Assistant Engineer of the Western District of the N. Y. C. & H. R., with office at Syracuse, N. Y.

Pearl & Leaf River.—O. R. Bilbro has been appointed Auditor, with headquarters at Hattiesburg, Miss.

Pere Marquette.—F. V. Davis, General Freight Agent, with office at Detroit, Mich., has resigned.

Philadelphia & Reading.—A. T. Dice, heretofore Superintendent of the Shamokin Division, has been appointed General Superintendent, with headquarters at Reading, Pa., succeeding W. A. Garrett, resigned. (See Cincinnati, New Orleans & Texas Pacific.) It is understood that J. E. Turk, Division Superintendent at Reading, Pa., will succeed Mr. Dice at Tamaqua, Pa. J. S. Caldwell, Division Engineer, with office at Philadelphia, Pa., has resigned.

Seaboard Air Line.—W. W. Mackall has been elected a Director.

Tennessee Central.—J. A. VanBlarcom has been elected President, succeeding J. Baxter, resigned.

Texarkana & Fort Smith.—E. P. Hall has been appointed Auditor, with headquarters at Texarkana, Texas, succeeding F. S. Carroll, resigned.

Tifton, Thomasville & Gulf.—M. Jungling has been appointed Master Mechanic, with headquarters at Kingwood, Ga. W. M. Turner has been appointed Supervisor of Bridges and Track.

See Georgia, Florida & Alabama.

LOCOMOTIVE BUILDING.

The Cincinnati, Richmond & Muncie is in the market for 30 locomotives.

The El Paso & Southwestern is having three locomotives built at the Schenectady Works of the American Locomotive Co.

The Cincinnati, Hamilton & Dayton, as reported in our issue of April 17, has ordered 10 locomotives from the American Locomotive Co., for August, 1903, delivery. These are to be simple 4-6-0 locomotives weighing 135,000 lbs., with 110,000 lbs. on drivers; diameter of cylinder, 19 in. x 26 in.; standard wagon top boilers, with a working steam pressure of 180 lbs.; 276 National Tube Company's tubes, 2 in. in diameter; Otis steel fire-box, 96 in. long and 40 in. wide; capacity of tender, 5,000 gal. of water and 12 tons of coal. Special equipment includes Westinghouse air-brakes, steel axles, Cook & Strong bell ringers, Keasbey & Mattison boiler lagging, Sterlingworth brake-beams, Christie and Westinghouse brake-shoes, Buckeye couplers, Star headlights, Damascus bronze journal bearings, C. H. & D. patent piston rod and valve rod packings, Coale safety valves, Leach sanding devices, Detroit sight feed lubricators, Railway Steel Spring Company's springs, Latrobe tires and cast-steel driving wheel centers.

CAR BUILDING.

The Sierra Ry. is asking bids on three standard passenger coaches and 25 box cars.

The National R. R. of Mexico has ordered 12 coaches from the American Car & Foundry Co.

The Virginia & Southwestern has ordered 250 gondolas from the American Car & Foundry Co.

The Rodger Ballast Car Co. has ordered five ballast cars from the American Car & Foundry Co.

The New Orleans & Northeastern has ordered three baggage cars from the American Car & Foundry Co.

The Santa Fe Land Improvement Co. has ordered 300 furniture cars from the American Car & Foundry Co.

The Lexington & Eastern has ordered 100 box cars of 60,000 lbs. capacity from the American Car & Foundry Co.

The Delaware, Lackawanna & Western is having 800 freights built at the Berwick Works of the American Car & Foundry Co.

The Kansas City, Mexico & Orient is having eight coaches built at the St. Charles Works of the American Car & Foundry Co.

The Mississippi River & Bonne Terre is having 200 coal cars built at the St. Charles Works of the American Car & Foundry Co.

The Lake Shore & Michigan Southern has ordered 15 70-ft. coaches from the Barney & Smith Car Co., to be duplicates of those delivered them last fall.

The Chesapeake & Ohio has ordered 158 flat cars of 80,000 lbs. capacity, and 131 coke cars of 60,000 lbs. capacity from the American Car & Foundry Co. These cars will be built at the Huntington Works.

The Chicago, Rock Island & Pacific is preparing plans for 100 wooden flat cars of 80,000 lbs. capacity, 50 cabooses and six ballast spreaders. The flat cars will be 40 ft. long, 8 ft. 9 in. wide and 42 in. high from rail. The cabooses will be 29 ft. long over end sills. The ballast spreaders will be 34 ft. long.

The Norfolk & Southern, as reported in our issue of April 24, has ordered 75 34-ft. box and 25 36-ft. flat cars of 60,000 lbs. capacity from the American Car & Foundry Co. The special equipment for both includes: Pressed Steel Car Co.'s bolsters, Congdon brake-shoes, Westinghouse air-brakes, Ajax plastic bronze brasses, Tower couplers, Thornburgh draft rigging, Symington dust guards, journal boxes and lids, Hutchins roofs for box cars, Railway Steel Spring Co.'s springs.

BRIDGE BUILDING.

ADAMS, MASS.—The Selectmen are receiving bids for an iron bridge over Hoosac River, 65 ft. long, with two sidewalks and a 24-ft. roadway.

ANDREWSVILLE, ONT.—The Grenville and Carleton County Councils are considering plans for re-constructing the inter-county bridge over Rideau River.

BANGOR, ME.—A survey has been made for a bridge from Water street, West Side, to Washington street, but the City Council has not as yet ordered the bridge to be built.

BARDWELL, KY.—A. T. Hobbs, County Judge, is receiving bids for a 100 ft. steel bridge to be built by the county over Mayfield Creek.

BOSTON, MASS.—The Cambridge Bridge Commission will receive bids for a steel arch bridge 1,760 ft. long, over the Charles River, estimated to cost $2,500,000. Contract has already been let for the substructure.

There is a bill before the Legislature providing for a highway bridge, with a draw, across Chelsea Creek from Orient Heights, Boston, to Webster avenue, Chelsea.

CANON CITY, COLO.—An iron bridge will be built over Arkansas River on South Ninth street.

CARPENTERSVILLE, N. J.—A bridge will soon be built across the Delaware River at this place.

CLEVELAND, OHIO.—The Newburgh & South Shore R. R. will build several bridges on its line between Cleveland and Newburgh, including a 68-ft. girder span over Harvard street, a 70-ft. girder span over Broadway, an 80-ft. girder span over the Ohio canal, a 200-ft. pin-connected through girder span over Cuyahoga River, and a Scherzer rolling lift bridge over Cuyahoga River.

COTTAGE GROVE, ORE.—The Lane County Court, Eugene, Ore., will receive bids until 2 p.m., May 6, for an 87 ft. span Howe truss bridge, with a 59-ft. approach, to be built over Coast Fork River.

ELYRIA, OHIO.—Plans have been made for two stone arch bridges to be built on Washington and Mussey avenues, at an expense of about $36,000.

EVERGREEN, ALA.—The County Commissioners will build four iron bridges.

GETTYSBURG, PA.—The County Commissioners will receive bids until May 15 for three bridges measuring 30, 40 and 70 ft.

GRAND FORKS, N. DAK.—The County Commissioners will build five new bridges.

GRAND LEDGE, MICH.—According to local press report, the city will vote on a proposition to issue $18,000 bonds for a new bridge across Grand River.

GRAND RAPIDS, MICH.—The Board of Public Works will receive bids until 1:30 p.m., May 15, for a concrete or concrete-steel arch bridge over Grand River at Bridge street. The bridge will have five arches and will be 448 ft. long and 66 ft. wide.

HALIFAX, N. S.—A $200,000 steel bridge is planned to connect this city with Dartmouth, with provision for railroad and street car tracks and a roadway for vehicles.

HAYS CITY, KAN.—M. P. Dinges, County Clerk, will receive bids until May 18 for a 100-ft. steel bridge to be built over Smoky Hill River.

HOUSTON, TEXAS.—Plans are said to have been made for a bridge between the Fourth and Sixth wards, to cost about $90,000.

INDEPENDENCE, IND.—The Council is considering the question of appropriating $35,000 for a bridge across the Wabash River.

LEXINGTON, KY.—The city has passed an ordinance directing a survey to be made for a viaduct over the C. & O. R. R., connecting Rose and Main streets.

MADISON, IND.—G. F. Crozier, Auditor of Jefferson County, will receive bids until 10 o'clock, May 6, for the substructure and superstructure of four steel bridges, and the masonry for three stone arches.

NEW HAVEN, CONN.—The Secretary of War has ordered a new stationary bridge at Kimberley avenue, to be built within a year. City Engineer C. W. Kelly writes that the matter is still in a preliminary stage and that nothing has been done in regard to asking bids.

OLEAN, N. Y.—The Olean Street R. R. Co. will build a bridge over Olean Creek. W. R. Page, President.

PITTSFIELD, MASS.—The city is said to have appropriated $10,000 for a bridge at East Housatonic street.

PUEBLO, COLO.—According to report, the city will issue $120,000 bonds for a viaduct at South Main and East Fourth streets.

SALEM, ORE.—B. B. Herrick, Jr., will receive bids until 1 p.m., May 8, for two bridges over Pudding River on the road to Pratum, and a bridge on the road from Mount Angel to Monitor.

SEDAN, KAN.—J. I. Crouse will receive bids until May 29 for two steel bridges, of two 80-ft. spans each, to be built by Chautauqua County at Elgin and Monett.

STREETSVILLE, ONT.—John McCauley, Chairman, Brampton, Ont., will receive bids until May 9 for substructure and superstructure of a 120-ft. steel bridge over Credit River.

SULLIVAN, IND.—It is said that the County Commissioners will receive bids until May 8 for 11 steel or concrete bridges.

TICONDEROGA, N. Y.—The Town Board has signed a contract with the Rutland R. R. Co. in regard to a footbridge across Lake Champlain.

TREMPEALEAU, WIS.—It is reported that the Burlington bridge over the Black River has been destroyed by fire at a loss of $100,000.

TYNDALL, S. DAK.—V. F. Kreycik, County Auditor, will receive bids at the court house until 10 a.m., May 19, for all bridges to be built by the Commissioners of Bon Homme County during the ensuing year. Bids are to be made by the lineal foot, accompanied by plans and specifications.

WINAMAC, IND.—It is reported that the County Commissioners will receive bids on May 5 for an iron bridge 221 ft. long over Tippecanoe River.

WYOMING, ONT.—Hugh Montgomery, Reeve, and John Ferguson, Commissioner, will receive bids until 10 a.m., May 9, at the town hall, for an iron bridge, 65 ft. span, with stone or concrete abutments.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

ATCHISON, TOPEKA & SANTA FE.—This company will relay 198 miles of track west of Albuquerque with 85-lb. steel rails. A contract will shortly be let for building 10 miles of track on the recently acquired Eureka & Eel River lines south from Pepperwood. (Official.)

BUCKHANNON & NORTHERN.—Surveys are reported for a line to be built by this company from a connection with the Green County R. R. at a point on the Pennsylvania-West Virginia State line, to Belington, W. Va., where a connection will be made with the West Virginia Central & Pittsburgh. The new line will pass through Fairmount, Grafton and Philippi, all in West Virginia.

CANADIAN NORTHERN.—An officer writes that work will be begun as soon as the weather permits on the main line of this company between Grand View and Edmonton, and that at least 300 miles of track will be laid during the coming season. (April 17, p. 289.)

CHARLESTON, CLENDENNIN & SUTTON.—Contract has been awarded to McArthur Bros., of Chicago, for grading the extension of this line from Ivydale, W. Va., up the Elk River to Sutton, 25 miles. W. W. Steorts has secured a sub-contract.

CHICAGO & INDIANA EASTERN.—Surveys are now in progress for the extension of this line from Muncie, Ind., southeast to Hagerstown, 35 miles, and it is said that work will shortly be begun.

Chicago, Cincinnati & Louisville.—Press reports state that the contracts for building this road from Cincinnati, Ohio, southwest via Madison, Ind., to Louisville, Ky., will be let about the middle of May. H. L. Jackson, Madison, Ind., is Chief Engineer.

Chicago Great Western.—During 1903, grade reductions between Randolph and Minneapolis, 42 miles, will bring the ruling grade on this portion of the line to the standard—26 ft. against eastbound traffic, and 36 ft. against westboand. Contracts have not yet been let.

Chicago, Rock Island & Pacific.—The Paul's Valley extension of this road from Chickasha southeast 49 miles to Paul's Valley, Ind. T., has been completed. This line was built jointly by the Rock Island and the Santa Fe. (See Construction Supplement.)

Choctaw, Oklahoma & Gulf.—Surveys are in progress for two branches, one from Benton to Hot Springs, Ark., 90 miles, and one from De Vall's Bluff to Des Arc, 14 miles. Press reports state that contracts for both extensions will be let early in the summer.

Columbia Interurban.—This company is being organized in Kentucky and a charter will shortly be asked for. W. K. Azbill is President; W. W. Bradshaw, Vice-President, and C. S. Harris, Secretary, all of Columbia, Ky.

Duluth & Northeastern.—It is reported that an extension will be built by this company from Island Lake, Minn., on the Cloquet River, southwest to Cloquet, on the St. Louis River, 25 miles. Surveys are now in progress. The Duluth & Northeastern runs from Hornby, on the Duluth & Iron Range, southwest to Island Lake, 24 miles. The road is standard gage, though built primarily for logging purposes.

Eustis R. R.—Articles of incorporation have been filed by this company in Maine. It proposes to build a narrow gage road from a point on the Phillips & Rangeley, near Dead River, to Redington, 16 miles. J. H. Byron, H. B. Austin and Fletcher Pope, of Phillips, Me., are said to be interested.

Fairmont & Colfax.—Incorporation has been granted this company in West Virginia to build from Hoult, Marion County, southeast to Colfax, five miles. M. Powell, Fairmont, W. Va., is one of the incorporators.

Fort Smith Light & Traction.—Articles of incorporation have been filed by this company in Arkansas. It is proposed to build and operate an interurban electric system across the Arkansas River near Van Buren. The company is capitalized at $300,000.

Garland Western.—Articles of incorporation have been filed by this company in Arkansas. It proposes to build a line from a point on the southern boundary of the city of Hot Springs, in a westerly direction to Mena, Ark., about 80 miles. S. W. Fordyce, E. H. Johnson, L. T. Hay, H. R. Morrison and others, of Hot Springs, are interested.

Gulf & Chicago.—The incorporation of this company was the final step in the consolidation of the Gulf & Chicago with the Mobile, Jackson & Kansas City, which is now being built northward to make a junction with the former road. The new company is capitalized at $4,000,000 by W. A. Liddell and C. S. Cullens, of New Albany, Miss., and J. Y. Murray, of Ripley, and others.

Illinois Union Traction.—Articles of incorporation have been filed by this company in Illinois. It proposes to build a system of interurban electric roads north from Monmouth to Aledo, Rock Island and Muscatine, 60 miles, and south from Monmouth to Roseville, Macomb and Keokuk, 70 miles. P. E. Elting, Macomb, Ill.; W. H. Beaver, Abingdon, Ill.; S. S. Hallam, Monmouth, and others are incorporators.

Kent Northern.—This company has been reincorporated in New Brunswick, and was granted a charter at the recent session of the Legislature. It extends from Kent Junction to Richibucto, N. B., 27 miles, and was sold under foreclosure in December, 1902. W. B. Carter, G. Robertson and others, of Kent Junction, are said to be interested.

Lake Erie & Southern.—Articles of incorporation have been filed by this company in Ohio, with a capital of $100,000. The road will extend from Lorain, Ohio, south via Oberlin to Wellington, 20 miles. The new line will parallel the Cleveland, Elyria & Western between Oberlin and Wellington. One purpose of the road is to develop some valuable stone property.

Laramie, Hahn's Peak & Pacific.—It is said that work will shortly be begun on this road from a point 25 miles southwest of Laramie, to Centennial Wyo., a distance of five miles. Contract for this section has already been let. Isaac Van Horn, 7 Congress street, Boston, is President. (See Construction Supplement.)

Lehigh Valley.—This company is building an extension three miles long to the plant of the Lackawanna Steel Co. at West Seneca, N. Y.

Malad Valley.—An officer writes that work is now in progress on this line between Corinne, Utah, and Garland, 50 miles, and between Garland and the Garland sugar factory, 1½ miles. Track laying will probably be begun within 30 days. The Utah Construction Co., of Ogden, Utah, has the contract for grading and bridging. The character of the work is light, with maximum grades of .4 of 1 per cent., and maximum curves of 2 deg. There are no important bridges or tunnels. The track will be laid by the company's own forces. The incorporators and officers of the company are all officials of the Oregon Short Line. Wm. Ashton, Salt Lake City, Utah, is Resident Engineer.

Memphis & New Orleans.—This company has been incorporated in Arkansas as a part of the St. Louis & San Francisco system, to build 180 miles in the State of Arkansas, of the extension to New Orleans. J. F. Hinckley, 800 Fullerton Bldg., St. Louis, is the engineer in charge of the work.

Michigan Central.—Contract has been awarded to W. E. Tench & Co., Detroit, Mich., for building a second track from Marshall west to Augusta, Mich., 23 miles. (April 24, p. 304.)

Minneapolis, St. Paul & Sault Ste. Marie.—Press reports state that four surveys are now being made for the proposed extension of this line in Minnesota—one working north from Glenwood; one north from Alexandria; one north from Parkers Prairie, and one north from Detroit. (For proposed extension, see April 24, p. 304.)

Nebraska, Kansas & Gulf.—It is reported that this company, which was recently incorporated in Kansas, has let a contract to the Federal Construction Co. for building a portion of its line. J. O. Reddig, Salina, Kan., is in charge of the work. (April 17, p. 290.)

New York Central & Hudson River.—Bids will be received until May 11, for the construction up to subgrade of the single track line, 16 miles long, between Bower and Curwensville, Pa., including the necessary sidings and changes of highways. This is on the Pennsylvania Division of the New York Central & Hudson River, in the townships of Greenwood, Penn and Pike, County of Clearfield, Pa. (See April 10, p. 274, under heading of Curwensville & Bower.)

Nova Scotia Eastern.—The contract between this company and the Nova Scotia Government for the construction of this line from Dartmouth to the Straits of Canso, with a branch to Cross Roads Country Harbor, has been ratified by the Nova Scotia Legislature. Surveys will immediately be made and work will probably be begun early next spring.

Oakland & East Side (Atchison, Topeka & Santa Fe).—This company is building a short line from Richmond to Oakland, Cal., 1½ miles, via Berkeley and Emeryville. Surveys have been finished and grading is now in progress by the company's own forces. C. S. McDonald is the Engineer in charge of the work.

Ocilla, Pinebloom & Valdosta.—It is reported that an extension of this line will shortly be built from Garretts west to Nashville, six miles, where a connection will be made with the Nashville & Sparks, which connects with the Georgia Southern & Florida at Sparks, Ga.

Oregon & Pacific.—Contracts for grading this line from Grant's Pass, Ore., southwest via Wilderville and Takilma to Crescent City, Cal., 92 miles, have been let to San Francisco contractors. No names are given. Work will be begun at once. (April 3, p. 256.)

Pennsylvania.—The proposed tunnel of this company across Manhattan Island at 32nd and 33rd streets, has recently been approved by the commission appointed by the Appellate Division of the Supreme Court.

Bids are being asked by this company for grading and masonry work on six sections of the Middle Division as follows: Completion of two tracks between Trimmers Rock and Newport; new four-track change of line at Newport; completion of four-track system between west end of Newport and Rope Ferry; completion of four-track system from west end of Rope Ferry to the Tower west of Millerstown; change of line from Latrobe to Millwood; completion of the "jump-over" at Waverly. Bids must be in by May 9.

The first step toward the construction of the Washington terminal and union station, which will involve an expenditure of about $10,000,000, has been taken by this company. Chief Engineer Brown has asked bids for a tunnel for two tracks on the present main line of the Philadelphia, Baltimore & Washington Railroad, from Seventh street and Virginia avenue, Washington, to Second street, southeast; a twin tunnel for two tracks on the new line from D street and New Jersey avenue, southeast, through private property and along the west side of Massachusetts avenue, northeast, and a new two-track line from the intersection of New York and Montana avenues, near Montello Station, of the Baltimore & Ohio Railroad, to a point near Magruder station, on the Philadelphia, Baltimore & Washington. The line will be five miles long. Bids will be submitted by May 11.

Pennsylvania & Mahoning Valley.—Bids will be received at the office of this company, 480 West Federal street, Youngstown, Ohio, for the grading and building of 2½ miles of track. Plans and specifications may be seen at the office. J. M. Walker is the engineer in charge of the work.

Pittsburgh, Lisbon & Western.—This company is planning an extension of its line from Lisbon west to a connection with the Wheeling & Lake Erie at Minerva, Ohio, 20 miles, and north to a connection with the Salem R. R. at Salem, Ohio, eight miles.

Pocono, La Anna & New Foundland (Electric).—A charter has been granted to this company, which was recently incorporated in Pennsylvania. The proposed route is from Mount Pocono, north via La Anna to New Foundland, Pa., 15 miles. J. B. Williams, of La Anna, is President. This company was reported in our issue of April 17, p. 290, under the heading of Mount Pocono-La Anna.

Rochelle Southern.—Contract has been let to McIntosh Bros., Milwaukee, Wis., for building an extension from Rochelle, Ill., south to Ladd, about 40 miles. This line will cross the Chicago & North Western and the Chicago, Milwaukee & St. Paul roads. Grading will be begun in a very short time.

St. Louis, Brownsville & Mexico.—It is stated that work will soon be begun on the proposed line from San Antonio to Brownsville, Texas, 260 miles. Surveys are reported in progress. Uriah Lott is one of the promoters.

Sierra R. R.—This company has recently contracted for $100,000 worth of 60-lb. steel rails to be laid between Cooperstown and Jamestown, Cal., 20 miles. Work will be begun as soon as the rails are delivered. The old rails taken up will be used on a narrow gage logging road which is being built from Campbell's station into timber lands.

Springfield Southwestern (Missouri Pacific.)—It is stated that work will shortly be begun on this line, which is to be built from Eldon, Mo., southwest to a point in the southern part of Missouri, in Taney County, where it will connect with the White River branch of the St. Louis, Iron Mountain & Southern. The new line will be about 125 miles long.

Tennessee, Georgia & South Carolina.—Application has been made by this company for a charter for a railroad from Anderson to Blue Ridge, Ga., 51 miles. W. B. Frink, Chicago, is President, and H. H. Watkins, of Anderson, Secretary. The principal office of the company will be at Blue Ridge, Ga.

Tonopah R. R.—The Nevada Legislature has recently granted right of way to this company from a point about 1½ miles south of Rhodes, to the new mining town of Tonopah. The road is to be narrow gage and the bill stipulates that work must be completed within 15 months.

Union R. R.—An officer writes that the line referred to recently in press circulars as a large and important piece of work, is merely a short extension of one of the present branches of this company to new coal mines, a distance of about half a mile. The grading is very light and is being done by the company's forces.

Washington Roads.—The Rainier Logging Co., of Port Orchard, Wash., will build a logging road 15 miles long to their mills in the vicinity of Port Orchard. Thomas Wilson, Port Orchard, may be addressed.

Whatcom-Skagit Interurban.—Articles of incorporation have been filed by this company in Washington. The proposed lines will pass through La Conner, Mount Vernon, Edison, Sumas and Lynden. G. G. Shelton and A. H. Wright, Whatcom, Wash., and B. F. Schaffer, Seattle, are incorporators.

Williamstown & St. Marys (Electric).—Rights of way are now being secured by this company for its proposed electric line from Williamstown, W. Va., via Parkersburg and Wheeling to Moundsville, 80 miles. The new line will parallel the Ohio River Branch of the Baltimore & Ohio for practically the entire distance.

GENERAL RAILROAD NEWS.

Atlantic Coast Line.—At a recent meeting of the stockholders of this company, the purchase of the Florida Southern and the Sanford & St. Petersburg was ratified. The former road runs from Palatka to Brooksville, Fla., 145 miles, and from Bartow to Punta Gorda, Fla., 73 miles, with several branches, making a total of 243 miles. The latter runs between Sanford and St. Petersburg, 153 miles. These two roads were sold to the Atlantic Coast Line in April of 1902, but the purchase had never been formally ratified.

Chicago Union Traction.—In default of payment of interest on five notes aggregating $1,154,293, Judge Grosscup of the United States Court, Chicago, has placed the Union Traction, the North Chicago Street, and the West Chicago Street railroads all in the hands of a receiver. Petitions for receivership were filed by the Guaranty Trust Co. of New York.

Detroit & Toledo Shore Line.—It is said that the receivership of this company will be ended on May 1, and that the property will be turned over to the Grand Trunk for operation. The issue of $2,000,000 4 per cent. bonds guaranteed by the Grand Trunk and the Toledo, St. Louis & Western has been signed and the claims against the company settled.

Erie.—The gross earnings for the last nine months of this road show a large increase over the same period last year. During the month of March net earnings increased $312,235, and for the nine months ending March 31, 1903, they were $10,173,753, an increase of $1,306,226.

Findlay, Fort Wayne & Western.—Judge F. J. Wing, of the United States Court, Toledo, Ohio, has issued a decree of foreclosure sale of this road, which runs from Findlay, Ohio, to Fort Wayne, Ind. The sale will take place in four weeks.

Hudson Valley.—This company is reported to have bought the property and franchises of the North River R. R., which was organized to build an electric line from Saratoga to Glens Falls, N. Y., and it is stated that work will be begun on this line immediately. A. B. Colvin is President, and G. A. Holmes, Secretary.

Kinkora & New Lisbon.—This company has been incorporated in New Jersey, with a capital stock of $40,000, to succeed the Columbus, Kinkora & Springfield. The line runs between Kinkora and Lewistown, N. J., 10 miles, and it was recently sold under a decree of the United States Circuit Court. Samuel Rea, J. P. Green and C. M. Bunting, of Philadelphia, and others are incorporators.

Los Angeles Traction.—This company has been sold to W. A. Clark. It controls 26 miles of track in the city of Los Angeles, Cal., and also the California Pacific, which operates a line 23 miles long between Los Angeles and San Pedro.

Michigan Central.—At a recent meeting of the Board of Directors of this company, a committee was appointed to negotiate a new contract with the Canada Southern. The present contract, which expires Dec. 31, 1903, provides for the operation of the Canada Southern in connection with the Michigan Central, and for an annual division of the gross earnings of both companies on a basis of two-thirds to the Michigan Central and one-third to the Canada Southern. W. K. Vanderbilt, Chas. F. Cox, H. B. Ledyard and Joseph E. Brown, of Blake Bros., compose the committee.

New York & Ottawa.—This road, which extends from Tupper Lake, Franklin County, N. Y., to Ottawa, Ont., 120 miles, will be sold at foreclosure sale on May 14. It is reported that it will probably be bought by the Delaware & Hudson. If this should be done the latter road would then have the shortest line between Ottawa and Albany.

Pennsylvania.—T. N. Ely, Chief of Motive Power of the Pennsylvania; D. S. Newhall, Purchasing Agent; A. W. Gibbs, General Superintendent of Motive Power; A. S. Vogt, Mechanical Engineer, and W. H. Baldwin, President of the Long Island R. R., have been appointed an advisory committee to assist President A. J. Cassatt in plans for the operation of the New York Terminal.

St. Louis & San Francisco.—See San Antonio & Aransas Pass below.

St. Louis Valley.—The East & West R. R., now building from Leo Rock, Ill., on the Mississippi River, to Altamont, has recently been sold to the St. Louis Valley.

San Antonio & Aransas Pass.—Press reports state that this company is about to pass into the hands of the St. Louis & San Francisco. The San Antonio & Aransas Pass owns about 700 miles of road which runs from San Antonio to Houston, Corpus Cristi, Kerrville, Aransas Pass and Waco. The announcement of the change of ownership of the road has been made to the State Railroad Commission by one of the officials of the Southern Pacific lines in Texas.

San Pedro, Los Angeles & Salt Lake.—The directors of this company have authorized a general mortgage bond issue of $50,000,000 of 5 per cent. gold bonds. The date of maturity and other details of the issue have not been decided, but it is stated that about $35,000,000 will be issued in the near future to provide for the recent purchase of the Oregon Short Line from Salt Lake City to Calientes, Nev., and to complete this line to a connection with the San Pedro, Los Angeles & Salt Lake. The remaining $15,000,000 will be reserved for future improvements and betterments.

Seaboard Air Line.—This company has sold to a syndicate organized by Ladenburg, Thalmann & Co., $6,000,000 4 per cent. gold bonds. The proceeds from the sale of these will be used to pay for the extension which is being built to Birmingham. The bonds are to be a first lien on the Birmingham Division.